SOIL SURVEY OF OCONEE, MORGAN, GREENE, AND PUTNAM COUNTIES, GEORGIA.

By DAVID D. LONG, of the Georgia State College of Agriculture, In Charge, and E. T. MAXON, N. M. KIRK, H. G. LEWIS, F. A. HAYES, E. C. HALL, H. V. GEIB, and G. A. CRABB, of the U. S. Department of Agriculture.—Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

The area comprising Oconee, Morgan, Greene, and Putnam Counties is situated in the north-central part of the State of Georgia, in what is locally called the "Heart of Middle Georgia." The town of Bogart, in the extreme northern corner of the area, is 9 miles west of the city of Athens, while the southern boundary of the area in Putnam County is about 24 miles north of Macon. The area is irregular in shape, its greatest length from north to south being 55 miles and its greatest width from east to west about 43 miles. These counties comprise a total area of 1,298 square miles or 830,720 acres. The county boundaries are to a small extent natural boundaries formed by streams and rivers, but more often they follow survey lines which at the present time (1919) are in some cases doubtful.[1]

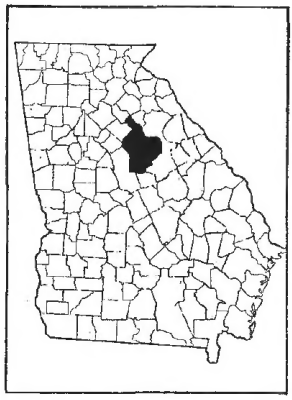

FIG. 19.—Sketch map showing location of Oconee, Morgan, Greene, and Putnam Counties area, Georgia.

All the counties of this group lie wholly within the Piedmont Plateau, a broad belt of country which extends from northern New Jersey to eastern Alabama. Oconee County is located practically in the central part of this belt in Georgia. The other counties extend southward toward the fall line which divides the Piedmont from the Coastal Plain country, the southeastern corner of Putnam County being about 14 miles north of this line.

[1] Where the county boundaries join with previously surveyed areas, as Jones and Jasper Counties, they are adjusted to the former surveys. The eastern boundary of Greene County is very irregular, and the courses and directions as shown on the map are taken from official records, although in some instances they do not conform to the local information of the landowners.

The topography of the area is the result of a long period of erosion of an old smooth plain or peneplain, whose former existence is indicated at the present time only by the smooth, even sky line in all parts of the area. The topography is typical of the Piedmont region, the upland being cut by the larger streams into major divides, which are in turn subdivided by the smaller streams, until the whole region is a series of ridges, the surface varying from undulating to gently rolling, rolling, and hilly. As a rule the streams have cut their courses about 100 feet below the crests of the intervening ridges. In parts of the area the slopes are smooth and long, while in other places the descent is rapid, with a correspondingly more broken and rougher topography. As the rivers are approached the topography invariably becomes more irregular and broken.

Besides the rounded hill topography of this area there are several areas of glades or flatwoods that lie well below the surrounding hills and have smooth, even, or gently undulating surface features. The flatwoods are found in Greene and Putnam Counties.

Along the rivers and larger creeks are level bottom lands, or flood plains, of varying width and extent. These plains are sometimes lacking in the V-shaped valleys of the streams in the rougher country. Terraces, or old flood plains, occur along the Oconee River in several places. They are smooth, even surfaced, and generally narrow.

Oconee County lies on the watershed between the Apalachee and Oconee Rivers. The divides or ridges are broad-crested, and the slopes to the streams gradual and well rounded, so that the acreage on which improved farm implements can not be used is very small. The more rolling areas are found along the Oconee and Apalachee Rivers.

Morgan County has a large area of gently rolling lands, composed of broad undulating ridges with long, smooth slopes. In the southern part of this county, beginning near Godfrey, as Little River is approached, the divides are narrower and the slopes steeper, and the streams cutting back into the uplands have deep V-shaped valleys, producing a more broken surface. Rolling to hilly topography also occurs along the Oconee River in the southeastern part of the county.

Greene County has the most varied topography of any county in this group. In the western part, along the Oconee and Apalachee Rivers, the surface features consist of rolling divides sloping steeply to the various streams. The main divides are cut by many lateral streams and lateral ravines, while the subdivides are narrow with steeply sloping sides, producing a sharply rolling to hilly topography. Other areas are rough and broken to such an extent that

agricultural operations are precluded or carried on with difficulty. In some places, however, there are areas of smooth, gently sloping land. Generally the topography becomes more broken as the Oconee River and the larger creeks are approached. In the north-central and northeastern parts of the county the surface features are smoother, owing to the broader ridges and the long and comparatively smooth slopes. Here the streams and branches have not cut as deeply into the upland as in the western part.

In the northeastern corner of the county, in the vicinity of Daniels Springs, there is a large area of glades or flatwoods which lies below the surrounding country and has a smooth, undulating surface. The topography of the southwestern part, the region of gray lands, is very smooth for the Piedmont region. Here the surface is gently undulating to very gently rolling, the stream valleys not so deep and the slopes gentle or well rounded. A characteristic of this section of the county is the frequent occurrence of series of low, rounded knolls. The topography of the northwestern part of the county, in the vicinity of the Oconee River, consists of gently rounded sand-covered hills and of broad bottom lands along the larger streams and terraces along the Oconee River.

Putnam County as a whole has the most rolling and hilly topography of any county in this group. The main divides are rolling and cut by many short streams with deeply incised tributary ravines and gullies. As the southern part of the county is approached the surface becomes more irregular and there are large areas of rough land along the streams. The crests of the ridges are farmed, while the rough, broken slopes are left in forest. A typical area of flatwoods is found in the northwestern part of the county, about 5½ miles northwest of Eatonton. Beginning at Presley Mill, it extends northeast in an area one-half mile to 1¼ miles in width for a distance of 3 miles. Bottom lands occur along most of the streams.

The general slope of the area is to the southeast. Oconee County has the highest elevations, ranging from about 700 to over 850 feet. In Morgan County the highest elevation is over 750 feet, decreasing to about 600 feet in the southern part. The elevation at Greensboro, Greene County, is 598 feet, while in the eastern and southern parts of the county it is less than 500 feet. The elevation at Eatonton, Putnam County, is 577 feet.

The drainage of the four counties, which is very complete, is carried almost entirely by the Oconee River system, a small section, the northeastern part of Greene County, being drained by the Savannah River system. The drainage of the area consists of an intricate net-

work of streams and branches, practically every farm being reached by at least one branch. In the areas of more broken topography the branches and stream heads are very numerous. The drainage of the upland areas is thoroughly established, except in the flatwoods areas, where the surface relief is not sufficient to give satisfactory run-off, and the internal drainage is retarded by the impervious nature of the subsoil.

Oconee County was organized in 1875. It is the most thickly settled county of the group, having in 1920 a total population of 11,067, or an average of 64.3 per square mile. It is the only county in this area in which practically all the farmers are white. All the population is classed as rural. Watkinsville, the largest town and the county seat, had a population of 465 in 1920. Bishop is an important trading point in this county.

Morgan County was formed from a part of Baldwin County in 1807. The settlers were chiefly from Virginia and the Carolinas, and many settled here as early as 1810. The county is well settled, the farming class being chiefly negroes. In 1920 the county had a population of 20,143, or an average of 51.6 per square mile. All the population is classed as rural. Madison, with a population of 2,348 in 1920, is the county seat and an important railroad point. Other towns of importance and their populations are: Rutledge, 643; Buckhead, 451; and Godfrey, 255.

Greene County is one of the oldest counties in the State, having been formed from a part of Wilkes County in 1786. Its original area comprised Hancock, Oconee, Oglethorpe, Taliaferro, and Clarke Counties. It was settled soon after the Revolutionary War by pioneers from Virginia and the Carolinas. The county in 1920 had a population of 18,972, all of which is classed as rural. The density of population is given by the 1920 census as 45.6 per square mile. Greensboro, the county seat and main town of the county, had a population of 2,128 in 1920. Union Point, the second town of importance, had a population of 1,126 in 1920. White Plains is an important trading point for the southeastern part of the county.

Putnam County was formed in 1807 from a part of Baldwin County. The greater part of the early settlement took place about 1808 to 1810, the settlers being for the most part from Virginia and the Carolinas. In the early days the county was thickly settled, but about 1825 the greater part of the population moved to newer counties. The population of the county as given by the 1920 census enumeration is 15,151. The county is the most thinly settled of any of this group, having an average of only 42 persons per square mile.

Eatonton, the chief town and county seat, in 1920 had a population of 2,519.

Railroad facilities for the area are generally adequate, there being only a few sections that are more than 10 miles from a shipping point.

The Athens Branch of the Central of Georgia Railroad, running from Macon to Athens, passes through Morgan and Oconee Counties. The Gordon-Porterdale Branch of this same system passes through Putnam County and nearly touches the southwestern part of Morgan County. The Georgia Railroad, extending from Augusta to Atlanta, passes through the central part of Greene and Morgan Counties, intersecting the Central of Georgia at Madison. A branch of this road which extends from Union Point in Greene County to Athens affords shipping facilities for the northeastern part of Greene County. From Union Point also the Union Point & White Plains Railroad extends to White Plains, furnishing transportation for the southeastern part of Greene County. The Greene County Railroad, a short-line road connecting with the Central of Georgia at Apalachee in Morgan County and extending to Monroe in Walton County, serves the northern part of Morgan County.

The public roads of the counties, though extensive, are chiefly of earth construction. Through the more sandy regions they are better than where the soils are heavy. Many of the main roads of Greene, Morgan, and Putnam Counties become almost impassable during the wet winter months. Good road-building material for macadam, pike, or soil-surfaced roads is available in all parts of the counties.

CLIMATE.

The climate of Oconee, Morgan, Greene, and Putnam Counties is characterized by a moderate winter, a long summer season, and abundant rainfall. The mean temperature for the year is about 62° F.; the highest temperature recorded is 108° F., and the lowest —3°.

The winters are generally short and include periods of mild weather, usually followed by rain, after which cold spells of a few days' duration occur. During these periods the temperature may drop to zero. In warm open seasons, winter temperatures of 75° to 80° F. may be registered. Outdoor work can be carried on the greater part of the time—without much discomfort. The summer season is long and hot. The mean temperature for this season is about 78° F.

The annual rainfall, which averages about 47 inches, is well distributed throughout the year and is ample for all the crops grown.

The precipitation for the driest year on record amounted to 29.17 inches, and even in that year was sufficient for the growth of crops; in the wettest year on record it amounted to 62.94 inches.

The average growing season for this region extends from about March 28 to November 2. The latest killing frost in the spring occurred on April 21 and the earliest in the fall on October 21.

The wind is prevailingly from the northwest, except during the months of May to August, when it is from the south. In September and October the winds are chiefly from the northeast.

The following tables give the rainfall and temperature records for Greensboro and Eatonton within the area, and Athens, about 3 miles from the Oconee County line:

Normal monthly, seasonal, and annual temperature and precipitation at Greensboro, Greene County.

[Elevation, 598 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1906).
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	44.8	76	14	4.26	4.35	3.54
January	43.8	78	9	3.23	3.15	6.11
February	44.8	80	7	5.09	3.61	2.61
Winter	44.5	80	7	12.58	11.11	12.26
March	54.9	87	17	4.45	2.92	6.40
April	61.5	91	28	3.04	1.16	1.10
May	71.4	101	35	3.08	1.42	3.72
Spring	62.6	101	17	10.57	5.50	11.22
June	77.5	104	43	4.55	2.28	10.38
July	80.3	106	54	5.12	2.83	8.15
August	78.0	101	56	5.09	7.94	7.37
Summer	78.6	106	43	14.76	13.05	25.90
September	74.2	100	40	3.05	2.35	3.40
October	62.6	94	24	3.38	0.41	2.64
November	51.9	83	17	2.76	2.60	1.49
Fall	62.9	100	17	9.19	5.36	7.53
Year	62.2	106	7	47.10	35.02	56.91

Normal monthly, seasonal, and annual temperature and precipitation at Eatonton, Putnam County.

[Elevation, 577 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1908).
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	45.4	79	9	4.07	4.29	3.46
January	45.0	79	10	3.40	3.60	6.11
February	46.2	80	7	4.74	4.13	6.28
Winter	45.5	80	7	12.21	12.02	15.85
March	55.4	91	15	4.54	2.92	5.54
April	62.5	93	27	3.30	1.19	11.01
May	71.8	99	36	3.37	2.21	2.02
Spring	63.2	99	15	11.21	6.32	18.57
June	77.8	103	43	4.32	0.96	4.39
July	79.8	105	58	4.89	1.48	2.98
August	79.5	100	58	5.27	5.28	10.98
Summer	79.0	105	43	14.48	7.72	18.35
September	74.9	100	40	2.63	T.	0.83
October	63.0	92	24	3.12	0.49	3.59
November	53.1	89	16	2.15	2.62	1.68
Fall	63.7	100	16	7.90	3.11	6.10
Year	62.9	105	7	45.80	29.17	58.87

Normal monthly, seasonal, and annual temperature and precipitation at Athens, Clarke County.

[Elevation, 694 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1908).
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	43.0	79	4	4.18	4.44	4.34
January	42.4	79	6	4.76	2.92	3.93
February	43.2	77	−3	5.25	5.15	7.26
Winter	42.8	79	−3	14.19	12.51	15.53
March	52.5	86	17	5.04	3.10	4.58
April	60.7	92	29	3.52	1.69	6.57
May	70.3	99	38	3.59	1.76	1.97
Spring	61.2	99	17	12.15	6.55	13.12

Normal monthly, seasonal, and annual temperature, etc.—Continued.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1908).
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*
June	76.8	105	43	4.45	2.93	3.82
July	79.1	108	56	4.95	2.55	3.81
August	78.3	99	56	5.10	5.37	18.43
Summer	78.1	108	43	14.50	10.85	26.06
September	72.9	99	41	3.39	1.05	1.88
October	61.9	96	25	2.83	0.99	4.01
November	51.4	83	17	2.90	2.58	2.34
Fall	62.0	99	17	9.12	4.62	8.23
Year	61.0	108	−3	49.96	34.53	62.94

AGRICULTURE.

At the opening of the nineteenth century the territory which is now embraced by Oconee, Morgan, Greene, and Putnam Counties was a vast forest, with only an occasional clearing made by some of the early traders and settlers. The upland forest was chiefly hardwoods—red, black, post, white, and Spanish oak, hickory, and some chestnut. Along the bottom lands black and sweet gums, tulip poplar, some white oak, willow, and alder formed the chief forest growth. There is very little of the original timber remaining in any of the counties, it having been removed in the early days, when it was customary to substitute new fields as soon as the old declined in productiveness. The present timber is second-growth loblolly and shortleaf pine. Over 90 per cent of Oconee County is cleared at the present time; about 86 per cent of Morgan County; 80 per cent of Greene County; and 75 per cent of Putnam County.

About 1802 a treaty with the Creek Indians was concluded by which this territory was obtained by the State, and a few years later the territory was opened for settlement under a lottery system. Many settlers came at this time from Virginia and the Carolinas.

The early agriculture was of a self-sustaining type, the main crops produced being corn, oats, wheat, and barley, while cattle, hogs, and sheep raised upon the open range were a source of food and clothing. As settlement progressed markets developed, and commodities difficult to produce were displaced by crops better adapted to the soil and climate and more economically grown.

Poor methods of farming by the early settlers are responsible for large areas of gullied lands in various parts of the counties. It is said that the early settlers, to secure better drainage, laid off the rows up and down the hills, with the result that many gullies formed in the fields and deepened with each rainfall. At present many of these have developed into ravines.

As the agriculture of the counties developed cotton became an important crop, gradually increasing in acreage until after the close of the Civil War, when, on account of the demand for a cash crop, it became the crop of greatest importance. Grain land was converted to cotton land and all new land was utilized for this crop. The production of cereals and animal products decreased rapidly, and it soon became necessary for all the counties to import these necessities. This condition continues to-day.

At the present time the agriculture is centered about cotton production, although there are many agencies at work toward diversification. Cotton is the cash crop and around it all commercial interests revolve. The following table shows for the various counties the acreage, yield, average yield per acre, and percentage of improved land in cotton, as given by the census enumerations of 1900, 1910, and 1920, respectively:

Cotton production.

County and census year.	Acres.	Bales.	Average yield, bales per acre.	Percentage of improved land occupied	County and census year.	Acres.	Bales.	Average yield, bales per acre.	Percentage of improved land occupied.
Oconee:					Greene:				
1900	24,716	6,992	0.30	46.0	1900	42,854	11,563	0.27	46.0
1910	34,843	15,544	0.44	48.0	1910	51,834	18,548	0.35	48.0
1920	38,562	18,564	0.48	62.5	1920	56,705	22,343	0.39	51.0
Morgan:					Putnam:				
1900	50,626	15,637	0.30	50.0	1900	36,971	9,384	0.25	39.0
1910	75,774	29,296	0.38	61.0	1910	41,053	15,580	0.38	40.0
1920	76,041	36,197	0.47	64.0	1920	42,488	15,046	0.35	45.6

Morgan County produces the greater quantity of cotton and also has the greater area devoted to this crop, while Oconee County claims the greatest yield per acre. A small part of the cotton produced is utilized by local mills at Greensboro and Eatonton.

The corn crop ranks second in importance, although there is an insufficient amount produced for local needs. Within the last year or two Greene County claims to have produced a sufficient quantity for its needs. All the corn produced is used on the farms for the feeding of stock and hogs and for meal. A comparison of the corn

crop in the several counties is given in the following table, compiled from the census returns of 1900, 1910, and 1920:

Corn production.

County and census year.	Acres.	Bushels.	Average yield, bushels per acre.	Percentage of improved land in corn.	County and census year.	Acres.	Bushels.	Average yield, bushels per acre.	Percentage of improved land in corn.
Oconee:					Greene:				
1900	13,962	64,260	4.6	26.0	1900	24,134	157,830	6.5	26.0
1910	15,185	178,169	12.0	21.0	1910	22,135	222,547	10.0	20.7
1920	16,961	209,053	12.3	27.5	1920	27,149	311,525	11.5	24.5
Morgan:					Putnam:				
1900	26,044	187,400	7.1	25.0	1900	24,111	144,550	5.0	25.0
1910	22,097	240,458	11.0	18.0	1910	19,494	186,573	9.5	19.0
1920	25,646	361,580	14.0	21.6	1920	21,614	239,405	11.0	23.2

From this table it is seen that the total yield and the average yield per acre have appreciably increased, while the acreage (except in Oconee and Greene Counties) and the percentage of improved farm land in corn has decreased. Since 1910 there has been an increase in the corn yields for the State as a whole and in the average yield per acre for these counties. The prolific varieties of corn are chiefly grown.

The oat crop is third in importance, although the production is insufficient for local needs. This crop has steadily decreased in importance since the period of early settlement. The production of oats is somewhat irregular, the acreage varying greatly from year to year. According to the census the acreage in 1919 ranged from 280 in Morgan County to 671 in Oconee County, and the yield per acre from 11.9 bushels in Greene County to 17.6 bushels in Oconee County. All the crop is used on the farms. A part is cut green for hay; some is allowed to mature and is fed in the straw or threshed. The Fulghum, Texas Rust Proof, and Appler are the most common varieties.

Wheat and rye are grown to a very small extent. The wheat produced is ground into flour at local mills, while the rye is chiefly used for winter pasturage.

Cowpeas are grown for the hay and seed, and to a large extent for soil improvement. Soy beans are grown to a limited extent for soil improvement and for pasturage.

Small experimental plots of alfalfa are being grown in all the counties. On some of the areas the crop has done very well, yielding from 2 to 4 tons per acre for the season.

The production of hogs and cattle does not meet the local demand. Increased interest, however, is being manifested in stock raising.

During recent years many purebred cattle and hogs have been brought into the counties by farmers and by various agencies devoted to the furtherance of the stock industry. There are considerable numbers of registered hogs of the Hampshire, Berkshire, Poland-China, and Duroc-Jersey breeds. The number of hogs has greatly increased since 1910. The farmers of the various counties are also becoming more interested in cattle, chiefly the beef types, such as the Shorthorn, Hereford, and Angus breeds. Purebred sires are common. Dairying is carried on to an appreciable extent in Greene and Putnam Counties. From Greensboro about 500 gallons of milk a day is shipped to Atlanta, while about an equal amount is sold to a creamery at Eatonton. The cows, chiefly Jersey grade, are fed on cottonseed meal and hulls and peavine hay. The pasturage is largely Bermuda grass.

While there is not a very large number of soil types in this area, they differ widely and materially influence the kind of crops grown from place to place. The farmers recognize, in a general way, that the bottom soils are best adapted to the production of corn and hay or for use as pasture, since cotton on these soils produces a very rank growth of weeds. Cowpeas also produce a rank growth of vine for hay but very little seed. The Iredell and Mecklenburg soils are suited to all the crops; but especially to the grasses and small grains, which on this type produce better than on the more sandy types. The Davidson soils are recognized as the strongest for all crops. The sandy loam and very coarse sandy loam soils produce better crops in dry seasons, while the clay loams and sandy clay loams are more productive in wet seasons. In the case of cowpeas a heavy yield of forage is produced on the clay loam and sandy clay types, while on the coarse and very coarse sandy loams the amount of forage is small, but a very large yield of seed is obtained. For sugar cane, sweet potatoes and sorghum the sandy types are usually preferred.

The work stock consists entirely of mules. The implements used on most of the farms are light and inefficient. Tractors are becoming common for power purposes, and improved implements, such as riding cultivators, disk plows, and harrows are commonly found on the better improved farms, usually operated by their owners. The buildings are small, but adequate for the needs of the cotton farmer.

It is desirable to plow land for cotton during the fall, but in most sections, where cotton is produced in large quantities, the crop can not be picked in time to permit plowing during this season. It is, therefore, necessary to prepare the land during the winter or early spring. This is done by plowing a furrow into which the fertilizer is placed; the land is then listed over the fertilizer and the seed planted in this bed. The more progressive farmers usually plow

the land broadcast before bedding, and many no longer plant in beds but practice level cultivation. The thoroughness with which the seed bed is prepared varies widely. The date of cotton planting ranges from early in April to late in May.

Cultivation of the crop begins when the young plants are well above ground by either "breaking out the middles" or "barring off" to facilitate in the chopping-out process. The young plants are thinned to a stand with hoes. Subsequent cultivations are given with sweeps and scrapes. Cotton usually is given four cultivations, but some of the better farmers give seven or eight cultivations.

As corn is a secondary crop, it is often grown on less productive soil, and receives less attention and less fertilizer than cotton; by many farmers, especially the tenants, it is almost neglected. This lack of attention is the chief cause of the low yields. Only a few of the better farmers plow the land broadcast, and very few of these plow in the fall. Most of the land is laid off with a small turning plow in rows from 3½ to 4½ feet wide, the seed is dropped, mainly by hand, into the water furrow and the fertilizers, when used, are applied at time of planting. Better farmers, following advanced methods, prepare the land thoroughly and use improved implements in planting and in the distribution of fertilizer. Where the drainage is poor these farmers plant on ridges, but otherwise they practice level cultivation. Ordinary practice calls for at least three cultivations, but, under the better methods, as many as eight cultivations are given. Corn is planted from the latter part of March to the last of June, planting at different dates being practiced in order to avoid the possibility of having the entire crop injured by drought. The leaves are pulled in July or August for fodder, a practice which is being discouraged. A number of farmers cut the corn and shred it, others cut only the part above the ears and pull the leaves below the ears. The corn is harvested during the fall or winter months.

The oat crop is handled in many different ways. The most common method consists of plowing the seed under with light plows. This usually leaves the ground in a rough condition. Some farmers, in order to smooth the land, harrow it after the seed is plowed under, The more progressive farmers seed the oats with the grain drill on plowed or harrowed land. A method which is becoming increasingly popular consists of drilling in oats in the cotton fields with small drills which seed about 3 to 5 rows between each row of cotton. While it is generally desirable to sow the crop early in the fall, either in the latter part of September or early in October, it is often impossible to get the crop in before early December, as the seeding occurs during the busiest time of cotton picking.

Wheat and rye are generally sown after the first frost, in about the same manner as oats.

When the crop is to be used for hay, cowpeas, which usually follow oats, are sown broadcast, and plowed or disked under. When intended for seed, soil improvement, or for roughage, they are planted between the rows of corn. Cowpeas and sorghum are also sown together for roughage. The varieties most commonly grown are Crowder, Iron, Whippoorwill, Brabham, and Unknown.

Commercial fertilizers are generally used, and the annual expenditure for this purpose is rapidly increasing. The amount expended by the several counties is shown in the following table, compiled from the census reports of 1900, 1910, and 1920.

Fertilizer expenditure.

Year.	Oconee County.	Morgan County.	Greene County.	Putnam County.
1920	$336,468	$632,687	$431,503	$283,374
1910	123,641	195,095	104,220	85,662
1900	37,910	65,320	40,270	27,300

Morgan County used the greatest amount of fertilizer, the expenditure averaging $224.19 per farm in 1919. Oconee County averaged $178.02 per farm on the 1,890 farms reporting, while Greene and Putnam Counties had a considerably lower average per farm, i. e., $149.61 and $133.98, respectively, the number of farms reporting in Greene County being 2,884, and in Putnam County 2,115. These amounts are for ready-mixed goods, as a very small percentage of farmers mix their own fertilizers. In Oconee and Morgan Counties the acreage application of fertilizers for cotton is from 300 to 500 pounds of a 9–3–3 grade, while in Greene and Putnam Counties about 200 pounds of a 9–2–2 or 8–2–2 grade is commonly applied. Four hundred to 600 pounds of a mixture of acid phosphate and cottonseed meal is commonly used by the more progressive farmers. Where large amounts of fertilizer are used, part of it is applied at the time of planting and the remainder later in one or two applications about the growing plants. Commercial fertilizers are not so commonly used on corn. Some farmers apply about 200 pounds of the grades used for cotton, while others use only about 100 pounds or, where available, a small amount of stable manure. The oat crop is not commonly fertilized. Some farmers apply 100 pounds of nitrate of soda in the spring, while others apply 200 pounds per acre of the mixture used for cotton. Occasionally applications range as high as 1,000 pounds and the grade as high as a 12–4–4 mixture. Nitrate of soda is occasionally used as a top dressing. Wheat is fertilized about the same as oats.

A definite rotation of crops has not been established, principally on account of the one-crop system and tenant problem, but the value of systematic rotation is recognized by the leading farmers, who in a small way rotate cotton, corn, and a small grain, followed by cowpeas for hay. Some fields have been planted continuously to cotton for the last 50 years, while on other fields the crops are changed as often as possible.

Farm labor is drawn largely from the negro population, and is in an unsettled state at present. Usually the supply is adequate. Under present conditions wages are extremely high and so variable that it is impossible to give a definite estimate of the expenditure.

According to the census reports of 1920, there were 1,952 farms[2] in Oconee County, representing 83.5 per cent of the entire area of the county and averaging 47.1 acres per farm. Morgan County contained 2,916 farms, comprising 66.1 per cent of the land area and averaging 56.6 acres per farm. In Greene County there were 3,000 farms, with an average of 65.4 acres per farm; 73.7 per cent of the land in Greene County is in farms. The farms of Putnam County numbered 2,281, representing 76 per cent of the area of the county and averaging 77 acres per farm.

Over three-fourths of the farms in this area are operated by tenants. The rent system predominates. The owner receives a stipulated quantity of lint cotton, usually 1,000 pounds, for the use of 30 or 40 acres. Under the share system the landlord furnishes the stock, implements, and one-half the fertilizer and seed, and the tenant the labor and one-half the fertilizer and seed, each receiving one-half of the gross receipts.

The price of farm land ranges from $5 an acre in the rougher parts of Putnam County to as much as $160 an acre in Oconee County.

SOILS.[3]

Oconee, Morgan, Greene, and Putnam Counties lie wholly within the Piedmont Plateau province, a region composed of widely differing igneous and metamorphic igneous, and crystalline rocks, all of which are so folded and faulted that as a whole the various formations represent a complex geological formation of unknown age. From these underlying rocks the upland soils are directly derived, while the narrow strips of bottom land have a similar but less direct origin. The soils are thus almost wholly residual from the underlying rocks.

[2] The census classes each tenancy as a farm.

[3] The soils of Greene County do not join those of Hancock County owing to a better understanding of the soils and to improvements in classifications since 1909, the year in which the survey of Hancock County was made. The soils in Putnam County which join those of Jones County do not agree. This is due to the fact that the soils derived from the dark-colored basic rocks have been classed in the Davidson series since the survey of Jones County was made.

The character of the soil types follows closely certain characteristics of these rocks, most important of which is the mineral composition, for similar soils may be derived from widely different formations, so long as the mineralogical composition of the rocks is similar. In other words, the greatest differences in the soils of this region are due to the difference in the mineralogical composition of the rocks. Therefore the soils under consideration may be grouped on a genetic basis, according to the character of rocks which underlie them.

The upland soil types are derived from four groups of rocks, viz, light-colored acidic rocks, dark-colored basic rocks, mixed dark and light-colored rocks, and, in a small area, from material of undetermined origin.

The soils derived from the light-colored acidic rocks are usually red or yellow in the subsoil, or yellow with red mottlings. Since the rocks are high in the feldspathic minerals, the soils usually show a preponderance of potash over lime in chemical analysis. In this class of light-colored rocks are found the granites, gneisses, schists, pegmatite, and quartz-mica schist. The soils derived from this group are classed in the Cecil, Durham, Appling, and Madison series.

The Cecil soils have light brownish gray surface soils in the light sandy areas and vary in color to reddish brown or red in the heavier types. The subsoil is characteristically a brittle, stiff, red or brick-red clay which contains more or less finely divided mica flakes. The very coarse sandy loam, sandy loam, fine sandy loam, sandy clay loam, and clay loam members of this series have been mapped together with three phases of the sandy clay loam type, the coarse phase, fine-textured phase, and hilly phase. The Cecil series embraces the most extensively developed soils in these counties.

The Durham series is in direct contrast to the Cecil series. The soils are light gray to yellowish gray and the subsoils are yellow. Two types are mapped, the very coarse sandy loam and the sandy loam. Both types are rather inextensively developed in Greene County alone.

The Appling series is intermediate between the Cecil and Durham series, being mottled yellow and red in the lower subsoil, which is normally a heavy sandy clay, though in places it is a reddish-yellow to salmon-colored sandy clay. The very coarse sandy loam of this series is extensively developed in Greene County and to a small extent in Putnam County. The sandy loam type is found in various-sized areas in all four counties, while the fine sandy loam has a restricted development in Putnam County.

The Madison series is very similar to the Cecil series in color, but is derived from mica-quartz schist. Two types are mapped, the gravelly sandy loam and the gravelly sandy clay loam. Both types are developed in Oconee County.

The second group of rocks includes the dark-colored rocks belonging to the Roan gneiss formation and consists of hornblende schist and hornblende gneiss, with associated areas of diorite and diabase. These rocks vary in texture and structure from massive and fine grained to schistose and medium grained. Three distinct soil series are derived from rocks of this group, the Iredell, Mecklenburg, and Davidson, all characterized by their heavy subsoils.

The Iredell series is found chiefly in the "flatwoods," where oxidation is prevented by lack of relief and consequent poor underdrainage. The soils are dark brownish gray and the subsoil a heavy, sticky, plastic clay much like putty and minutely mottled with yellow, brown, gray, and green, which gives to the whole mass a yellowish-brown color with a greenish or olive tinge. The Iredell loam is the only type mapped. It is found in Greene and Putnam Counties.

The Mecklenburg series is somewhat better drained than the Iredell, and differs from it in having a yellowish-red subsoil. The surface soils are brownish gray to brown and the subsoil a yellowish-red or mottled red, yellow, and gray, plastic, heavy, sticky clay. The fine sandy loam type is mapped in Greene County and the loam type in Putnam County.

The Davidson series represents the most completely oxidized soils from this group of rocks. The soils have a very dark red (maroon-red) or dark-chocolate color. The subsoil is a dark-red, heavy friable clay which is very sticky when wet. The clay loam type of this series is mapped in all the counties except Oconee. A hilly phase of the Davidson clay loam is mapped in Greene County.

The soils which are derived from a mixture of the light and dark colored rocks are found under one series and one type, the Wilkes sandy loam. The rocks composing this type are in part light-colored gneisses or granites, some so-called aplitic granite, and thin seams of pegmatite. The dark-colored rocks associated with these are chiefly diorites. The Wilkes sandy loam has a gray surface soil and an upper subsoil of a yellow sandy loam to light sandy clay, while the lower subsoil is a heavy, plastic, sticky clay mottled yellow and red, or like that of the Iredell series.

The material forming the Molena series is of undetermined origin. It consists of a blanket of sandy material spread over the hills. The surface soil is dark brown to reddish brown, and the subsoil a red to dark-red, friable sandy clay.

The alluvial types are formed through stream action, the material composing the types having been contributed from the areas drained by the streams along which they are found. There are two groups of alluvial soils, one comprising terraces or old alluvium which is now well above overflow and the other occupying the flood plains

of the streams, or first bottoms, of recent origin. The material of the latter is subject to more or less change with each inundation.

The terrace soils include the Wickham and Altavista series. The Wickham series consists of light-brown to reddish-brown surface soils and a reddish-brown to red fine sandy clay to clay subsoil. The sandy loam is the only type of this series mapped. It is not found in Putnam County.

The Altavista series has light-gray surface soils and a yellow sandy clay subsoil, mottled with red and gray in the lower part. The sandy loam type is mapped in small areas in Greene County.

The first-bottom alluvial soils include the Congaree series and Meadow (Congaree material).

The soil of the Congaree series is light brown to reddish brown in color, while the subsoil is typically a light-brown or brownish-red, friable, mellow, silty clay. Two types of this series are mapped, the fine sandy loam and the silty clay loam. Both types are found along the streams of all four counties.

Meadow (Congaree material) represents first bottoms in which the material is so intricately mixed in texture, color, and structure that no definite soil-type designation could be given to it.

The following table gives the names and actual and relative extent of the several soil types mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy clay loam	321,664		Molena sandy loam	4,544	0.6
Fine-textured phase	10,368	41.2	Cecil fine sandy loam	4,544	.6
Coarse phase	7,296		Iredell loam	4,416	.5
Hilly phase	3,456		Congaree fine sandy loam	3,264	.4
Cecil sandy loam	132,416	15.9	Madison gravelly sandy clay loam	2,752	.3
Davidson clay loam	101,120	12.3	Appling fine sandy loam	2,688	.3
Hilly phase	1,024		Wickham sandy loam	2,624	.3
Cecil clay loam	56,128	6.8	Durham very coarse sandy loam	2,240	.3
Appling sandy loam	31,872	3.8	Madison gravelly sandy loam	1,664	.2
Wilkes sandy loam	31,296	3.8	Mecklenburg loam	1,536	.2
Meadow (Congaree material)	30,720	3.7	Altavista sandy loam	640	.1
Appling very coarse sandy loam	24,128	2.9	Durham sandy loam	448	.1
Congaree silty clay loam	22,784	2.7	Rock outcrop	256	.1
Cecil very coarse sandy loam	19,520	2.3			
Mecklenburg fine sandy loam	5,312	.6	Total	830,720	

CECIL VERY COARSE SANDY LOAM.

The surface 7 or 8 inches of the Cecil very coarse sandy loam consists of a loamy very coarse sand to light coarse sandy loam of light grayish brown to yellowish-gray color. The material is relatively high in fine gravel and coarse sand, but contains sufficient fine sand

and silt to give the soil a loam texture. While the soil is classed with the "gray lands" of the area, it has a distinctly more brownish cast than the associated Appling and Durham types. The subsoil is a heavy, stiff, brittle light-red clay, which contains considerable coarse material. While the soil typically rests upon the heavy red subsoil, there are small areas in which there is an upper stratum of yellow very coarse sandy loam to coarse sandy clay extending to depths as great as 18 inches. These areas represent a gradation toward the Appling very coarse sandy loam. The type includes a few small areas of shallow soil with small clay spots appearing at the surface, and others in which the surface material is finer than typical.

The Cecil very coarse sandy loam is derived from a very coarse-grained, massive, porphyritic granite which lies a short distance beneath the surface and often outcrops in the form of bowlders. The numerous bowlders are indicated on the map by rock outcrop symbols. They are of considerable size, averaging 800 to 1,200 cubic feet. Smaller outcrops, of which there are many, are not indicated.

The Cecil very coarse sandy loam has its largest development in Greene County; a few areas are also found in Putnam County.

Greene County.—This type covers a large area in the southern part of Greene County. The largest development begins just southeast of Greensboro and extends in an irregular strip about 3 miles wide southward nearly to the Hancock County line. Large typical areas occur north and south of Veazey and 3 miles east of Siloam along the headwaters of the South Fork of the Ogeechee River.

All the type in this county has a smooth, undulating to very gently rolling topography, excepting a few areas near the junction of Bruce and Pierce Creeks and between Kimbro and Hightower Creeks, where the surface is more rolling and broken. The type occupies smooth divides and long, gentle slopes to the streams. Gently rounded knolls are a common feature of the topography. It appears that this type develops where the surface is a little more uneven than that occupied by the Appling very coarse sandy loam. Small undulations in the region of the associated Appling soils usually give rise to the Cecil.

The greater part of the type in this county is cleared and under cultivation.

Putnam County.—The Cecil very coarse sandy loam is not extensively developed in Putnam County. Several areas are mapped in the northeastern part along the Oconee River. The type here is not quite as coarse as typical. The topography is very rough, consisting of narrow-crested ridges and steep, broken slopes. For this reason only a few small areas are under cultivation, and these are restricted to the ridge crests.

The timbered areas at present consist of second-growth pine, but the original growth was largely hardwoods, with some longleaf pine. This was removed in the early days of settlement.

The crops common to this section are grown. Cotton averages from one-fourth to one-third bale, but on land where rotations have been practiced yields of 1 bale per acre are not unusual. Corn yields from 5 to 15 bushels per acre, and oats from 10 to 20 bushels. From one-half to 1 ton or more of cowpea hay is obtained per acre

A number of well-established farms are situated on this type. The open, coarse texture and the loose structure of the type permits plowing and cultivation to be carried on with ease, and the soil can also be handled under a wide range of moisture conditions. In wet seasons crops are often damaged by excessive moisture, as the heavy subsoil holds the precipitation which passes readily through the surface material. The best yields are obtained in seasons of moderate rainfall. Nearly all the cultivated crops are planted on beds and it is often necessary to replant on account of the seed rotting. The crops on this type make a relatively small vegetative growth, with a correspondingly large yield of fruit.

Land of the Cecil very coarse sandy loam type is held at $40 to $80 an acre.

This soil is capable of being built up to a fairly high state of productiveness through the growing and turning under of green-manure crops, especially the legumes, and by the addition of organic matter in the form of manure.

CECIL SANDY LOAM.

The soil of the Cecil sandy loam, to an average depth of about 7 or 8 inches, consists of a gray or light-brown friable loamy sand to light sandy loam. In many places the lower part of the soil is a yellowish-gray light sandy loam. The subsoil, which begins as a yellow to yellowish-red, friable, heavy sandy loam to light sandy clay, gradually becomes heavier, passing into the typical friable red clay, which is sticky and tenacious when wet. The yellowish upper subsoil varies in depth from 1 inch to 18 inches, and where it is deepest the type approximates in character the Appling sandy loam type. The soil may rest immediately upon the heavy red clay, and in this case the surface soil usually is considerably browner or redder than typical. Most of the type is free from stony material, although in places quartz fragments are scattered over the surface in sufficient quantities to give a stony sandy loam. The more stony of such areas are indicated on the map by stone symbols. Here the stones seriously interfere with cultivation.

The type as mapped includes small areas of the Cecil sandy clay loam and of the Appling sandy loam, and in a few places the sur-

face soil has a fine sandy loam and in others a coarse sandy loam texture, such areas being too small to map.

This type, with other sandy loam, fine sandy loam, and very coarse sandy loam soils, is referred to locally as "gray lands."

The Cecil sandy loam is derived, through weathering, from feldspathic or acidic light-colored rocks, including gneiss, schist, and granite. The type has a wide distribution, being found in large areas in all four counties.

Oconee County.—The Cecil sandy loam is typically developed in all parts of Oconee County. The largest areas occur in the central part of the county; they follow the main divides, which have a smooth, undulating surface. Where the topography breaks the type grades into the Cecil sandy clay loam.

Morgan County.—In Morgan County the type is not as extensive as in the other counties, though areas occur in all parts, both on the crests of ridges and on slopes around the heads of streams. The largest areas lie in the northwestern part of the county, from the vicinity of Rutledge to Bostwick. In places near these towns the type grades toward the Appling sandy loam. The topography is gently rolling, and the land is well suited to farming. Drainage is well established. Between 85 and 90 per cent of the type in this county is cleared.

Greene County.—The Cecil sandy loam occurs in large continuous bodies in all sections of Greene County. A large typical area is mapped southeast of Union Point, near the headwaters of the Ogeechee River. Here small areas of Cecil sandy clay loam and Appling sandy loam are included with the type as mapped. Just west of the Athens Branch of the Georgia Railroad, between Union Point and the Oglethorpe County line, large areas of this soil are found on the crests of ridges and on the smoother slopes to the streams. The topography here is well suited for farming with improved implements. In the northwestern part of the county large areas are mapped between the Oconee and Apalachee Rivers. In places the surface soil appears to be derived in part from the same material as the Molena sandy loam. Near Greshamville the surface soil is very light gray, while the upper subsoil is yellow, this stratum being relatively thick. South of Greensboro, in the vicinity of Walkers Church, the type closely resembles the Cecil sandy clay loam and has a more rolling surface than the other areas, though it is not so badly cut by stream heads and gullies. Stony areas are also found in this vicinity. East of Woodville there are a few small areas the texture of whose surface material is almost a fine sandy loam. Most of the Cecil sandy loam in Greene County is derived from granitic gneiss, which is closely associated with the more extensive porphyritic gran-

ite of this county. About 75 per cent of the type is cleared and under cultivation.

Putnam County.—Large areas of the Cecil sandy loam are mapped in all parts of Putnam County. As typically developed, the soil profile includes a yellowish upper subsoil layer. Small areas in the vicinity of Mission School, however, have a sandy surface soil resting upon a heavy red clay subsoil. The type is most extensively developed in the eastern part of the county.

About 4 miles east of Eatonton there is an area of 600 to 700 acres that represents a marked variation in the type. Here are included areas having a sand soil as much as 3 feet deep, while in close proximity small knolls of the red clay subsoil are exposed, the depth of the sand varying as either the sand or clay spots are approached.

About a mile east of Jefferson Church the Cecil sandy loam contains some small areas of Appling sandy loam, which occur so irregularly that they could not be separated in mapping.

In the eastern and southwestern parts of the county the type contains many stony areas that are indicated on the map by stone symbols. These stones, which consist of fragments of quartz, are abundant on the surface and through the soil mass.

As areas of the Cecil fine sandy loam are approached the texture of the sandy loam becomes finer, the two soils grading imperceptibly into each other. This condition prevails in a strip of country extending from Meda toward Phoenix and from Dennis to Rockville.

The general topography of the type in Putnam County is rolling to sharply rolling. The crests of the ridges are narrow and break quickly to long slopes which are deeply cut by the heads of streams. In many places a decidedly choppy topography is found. Very little bedrock is seen in this type. Medium to coarse grained biotite gneiss is the most common rock giving rise to this soil.

In Putnam County about 85 per cent of the type is cleared, but only about 60 per cent is under cultivation.

The original forest on this soil consisted of oaks, hickory, and some shortleaf pine. This was removed in the early days of settlement. The present forest is mainly second-growth shortleaf pine.

All the crops common to the region are grown on this type. Cotton, the chief crop, averages from one-third to one-half bale per acre. On some of the better managed farms a bale or more per acre is obtained. Corn ranges in yield from 8 to as much as 50 bushels per acre, averaging 10 to 15 bushels. Oats average 14 to 18 bushels, wheat about 8 or 9 bushels, and cowpea hay from one-half to 1 ton per acre. The yields in Oconee County are considerably higher than in the other counties. The best yields on this type are obtained in seasons of moderate rainfall, as in wet seasons the rainfall, which is

readily absorbed by the loose surface soil, is checked and held by the heavy subsoil, saturating the soil and injuring the crops.

Land values on this type range from $20 in Putnam County to as much as $175 an acre in Oconee County.

The Cecil sandy loam is a good, strong soil and can be used for a wide range of crops. Besides the ordinary farm crops, it is well suited for the production of special crops, such as peaches and tobacco, and for trucking.

A valuable feature of the type is its light sandy surface soil, which can be prepared with light implements, is cultivated with ease, and can be worked under a wide range of moisture conditions. Many well-improved farms are found on this type. Like the very coarse sandy loam, it would be greatly benefited by the addition of organic matter in the form of coarse manures or by turning under green cover crops.

CECIL FINE SANDY LOAM.

The surface soil of the Cecil fine sandy loam consists of a light brownish gray or slightly reddish brown loamy fine sand, 7 or 8 inches deep. The subsoil, which normally begins as a yellowish-red fine sandy clay, becames heavier with depth and passes at an average depth of 14 inches into the typical brittle, heavy red clay, which extends to the depth of 3 feet or more. In places, especially where a stream is approached, the gradation zone in the upper subsoil becomes deeper, and the soil resembles the Appling fine sandy loam. There are a few small areas having a smooth, level surface in which the upper 20 inches of the profile consists of fine sand to loamy fine sand. These also resemble the Appling fine sandy loam. Small areas of the Appling are included with the type as mapped, especially northwest of Texas Church in Putnam County. In places outcrops of the heavy red clay subsoil are encountered, but they are of small extent.

On the surface and throughout the soil mass there is considerable stony material. Where this stony material is present in large quantities the soil is a stony fine sandy loam, and these areas are designated on the map by stone symbols. The stones range in size from very small pieces to fragments 12 to 15 inches in greatest dimension, and are composed chiefly of quartz from veins in the original rocks. The rock from which the soil is derived is very seldom seen, as weathering has extended to considerable depths. A few exposures of an aplitic granite and fine-grained biotite gneiss were seen at several places, but the mass of the soil material appears to be derived from a different rock formation.

The Cecil fine sandy loam is mapped only in Putnam County. The largest areas lie east of Eatonton in the vicinities of Whites Chapel,

Texas Church, and Rockville. Other areas are found in the southwestern part of the county, between Stanfordville and the Jones County line, and in the vicinity of Alta Vista.

This type has a very rolling surface, with few smooth or level areas. The crests of the ridges are somewhat rolling, and along most of the stream courses the slopes are very steep. The areas vary widely in topographic conditions. The natural drainage is good. The surface run-off is rapid in places, and the land must be protected against erosion by terracing.

About 80 per cent of this type is cleared, and most of the cleared area is under cultivation. The present forest consists chiefly of second-growth shortleaf and old-field pine. The type is utilized for the production of the staple crops of the county. Cotton is the chief crop. Corn, oats, and cowpeas follow in the order named. The yields are about the same as on the Cecil sandy loam. This is a good general-farming soil where the surface is not too rough to preclude the use of improved farm implements. Owing to its fine texture, the surface soil often becomes hard and breaks in clods when plowed, but these clods are very easily broken down in subsequent cultivations.

Land of this type has an average selling price of about $25 or $30 an acre.

CECIL SANDY CLAY LOAM.

In untilled areas the surface soil of the Cecil sandy clay loam consists of 2 to 5 inches of a brownish-gray to light reddish brown loamy sand to light sandy loam, underlain by a friable reddish-brown clay loam that extends to a depth of 7 or 8 inches. However, when the type is plowed and the light sandy covering is mixed with the heavy red material, the whole surface part of the type becomes a friable, mellow sandy clay loam of reddish-brown to red color. The soil is lighter or heavier, and grayer or redder, according to the proportion of light sandy material contained. The subsoil is a brick-red, brittle, heavy clay, which becomes sticky and plastic when wet.

Under field conditions the Cecil sandy clay loam contains scattered spots, less than an acre in extent, of the typical red clay loam and of the typical light grayish brown sandy loam. This type, being intermediate between the clay loam and sandy loam of the Cecil series, represents the gradations between those two types. As mapped, the type includes areas consisting almost entirely of spots of clay loam and sandy loam so closely associated that it is advisable to class such areas with the sandy clay loam. Locally this type is referred to as "mulatto land." Areas in which quartz stones are present in sufficient quantity to interfere with cultivation are indicated on the map by stone symbols.

This type is an upland residual soil derived through the weathering of light-colored feldspathic rocks. Throughout a large part of the type the parent rock is obscured by a thick layer of soil material. Most of the type appears to be derived from biotite gneiss. Granite also enters into the composition of the soil in a number of places. In some places the subsoil has been modified by admixture of material from basic rocks occurring in veins; in others the type is derived from an "injection gneiss" which contains considerable hornblende. The influence of these basic materials is shown by a darker color of the soil and subsoil, the type in its extreme variation resembling, except in texture, the Davidson clay loam.

The Cecil sandy clay loam is the most extensively developed type in the four counties. It occurs in areas covering entire sections, except for small included areas of other soils. The type varies greatly in topography.

Oconee County.—The Cecil sandy clay loam is typically developed in Oconee County in large continuous areas, which cover broad, undulating to gently rolling, smooth ridges and long, gentle slopes. The topography, however, becomes rolling to sharply rolling along the Apalachee and Oconee Rivers as Greene County is approached, and a few small areas along Greenbrier and Rose Creeks are very rolling to hilly.

While the type is rather uniform throughout the county, it is more sandy in the smooth topographic positions or higher parts of the broad divides than in the more rolling areas along the streams.

In Oconee County the type is derived principally from medium-grained biotitic gneiss, and in a few places from quartz-mica schist in combination with gneiss. In one small area an intrusion of diorite cuts through the gneiss. Over 90 per cent of the type in this county is cleared and farmed.

Morgan County.—The Cecil sandy clay loam is the predominant soil in Morgan County, being mapped in large continuous areas in all parts of the county. It is found under all topographic conditions, from undulating to sharply rolling, and occurs on ridges, slopes, and knolls. Considering its broad extent, the type is rather uniform, although the variations common to the type occur.

In some places, as north and east of Rutledge and along the road between Madison and Bostwick, the soil is rather red, resembling the Cecil clay loam, and on the smooth divide in the vicinity of Bostwick and Fair Play, and east of Fair Play, the soil is sandier than typical and grades toward the sandy loam. A number of areas resemble more or less closely the soils of the Davidson series. This variation occurs where the underlying rocks are mixed, being in part acidic and in part sub-basic or basic. Such areas lie north of Indian Creek School and west of Indian Creek, and also between

Wildcat Branch and Gap Creek. In these vicinities the soil is dark in color, but contains considerable sand.

In the southeastern part of the county, between Indian and Little Sugar Creeks, along the Dixie Highway, as the region of basic rocks is approached, the type grades very close to the Davidson clay loam. A large proportion of the soil material is derived from basic rocks, while the sand is largely contributed through the weathering of vein quartz. In some places in this vicinity the boundaries separating this type from the Davidson are arbitrarily placed.

The outcropping of quartz veins gives rise to stony areas which are shown on the map by symbol.

Variations from the generally rolling topography are found in a number of places. Sharply rolling to hilly and broken areas lie along the Putnam County line about a mile west of the Dixie Highway; along the Walton County line between Hard Labor and Rocky Creeks, and between Chestnut Grove Church and Hard Labor Creek; in the southern part of the county between Pennington and Godfrey; and in the northern part of the county along Jacks Creek and the Apalachee River. About 70 per cent of the type is cleared and farmed. The forested areas support second-growth shortleaf pine.

Greene County.—This type is most extensively developed in the northern half of Greene County. It is most typically developed in the northeastern part, where it occurs in the largest areas. In the northwestern part of the county the areas are broken by other types of soils. As the rivers of the western part of the county are approached the topography becomes more rolling and small areas of the sandy loam and clay loam of the series give the map a more spotted appearance. The Cecil sandy clay loam in this county includes only a few stony areas, and these are indicated on the map by stone symbols. In the northeastern corner of the county, between the North and South Forks of Little River, beginning near Temple Bell School and extending to near the county line, there is a large area which is derived from diorite mixed with other light-colored feldspathic rocks. The soil here grades close to the Davidson clay loam. West of Penfield the same condition prevails over a considerable area.

About 50 to 60 per cent of the type in this county is cleared and under cultivation. The uncleared areas are in second-growth shortleaf pine.

Putnam County.—The Cecil sandy clay loam is less extensively developed in Putnam County than in the other counties covered by this survey. Areas are mapped in all parts of the county. A large part of the areas consist of spots of sandy loam and clay loam of the series too small to be mapped separately. Generally the subsoil is heavier and more compact than in the more typical areas in the

other counties. Basic rocks also enter into the formation of the type here, especially west of Dennis Grove School and southwest of Mount Gilead Church.

The topography in this county is decidedly more rolling and broken than in any of the other counties. The broad, gently rolling ridges of the northern counties break into a series of narrow-crested ridges which are dissected by the heads of many streams. About 75 per cent of the type is cleared and about 50 per cent is under cultivation at the present time (1919).

The Cecil sandy clay loam is a strong, productive soil, and supports many well-established farms in all four counties. All of the staple crops of the region are produced successfully, but cotton is the most important. The average yield of cotton is about one-third bale in all the counties except Oconee, where the average is nearly one-half bale, the yields ranging from one-fourth bale to more than 1 bale per acre. On some of the well-established farms, where the crop is well handled and fertilized, yields of more than 1 bale per acre are common. The average corn yield is about 12 to 15 bushels, although more than 50 bushels are obtained in favorable seasons and under good management. Oats yield from 10 to 40 bushels per acre, the average being about 12 to 15 bushels. Yields of one-half to 1 ton or more of cowpea hay are obtained. Methods of fertilization on this type are the same as described in the chapter on agriculture.

The Cecil sandy clay loam is a desirable soil and adapted to a wide range of crops. The soil does not suffer from drought as quickly as the clay loam nor from excess moisture as quickly as the sandy loam. On account of these qualities the farmers generally prize the type.

Land values range from $25 to more than $175 an acre, depending upon the topography, location, and improvements.

Cecil sandy clay loam, hilly phase.—The hilly phase of the Cecil sandy clay loam is mapped in Greene County. It is developed in a region of such a broken and hilly topography that the use of the land for farming is precluded. The principal area is in the southern part of the county, along the Oconee River, in the vicinity of Long and Riley Shoals. Here the country consists of narrow-crested ridges and steep slopes, broken by many short wet-weather streams and gullies. The areas of this phase are valuable only as pasture and forest lands.

Cecil sandy clay loam, fine-textured phase.—The fine-textured phase of the Cecil sandy clay loam is mapped in Putnam County. The phase differs from the typical soil in that the sandy upper layer of the soil is fine to very fine instead of medium in texture. In a number of places the color of the subsoil is dark red, similar to that of the Davidson subsoil. On the surface and throughout the soil and sub-

soil there are large quantities of quartz fragments. These areas are indicated on the map by stone symbols.

The fine-textured phase of the Cecil sandy clay loam is derived from fine-grained rocks similar to those which give rise to the Cecil fine sandy loam, but the material seems to be modified considerably by material derived from basic rocks. Basic rocks lie beneath the phase, four miles southeast of Eatonton, in the vicinity of Union School, and along Crooked Creek north of Pinkerton Grove Church. In these regions the dark color of the soil and subsoil is especially noticeable along the lower slopes toward streams.

The phase is mapped in large areas in the region of fine soils in the southeastern part of Putnam County, from Little River northeastward to Rockville.

The very rolling topography and the consequent erosion of the phase are in part the cause of spotted red and gray areas. Much of the fine material has been removed from the surface, leaving the uppermost layer rather shallow. Drainage is thoroughly established.

The greater part of the fine-textured phase is cleared and in cultivation. Yields are about the same as on the typical soil, possibly a little higher. The phase is heavier than the typical soil, is a little more difficult to plow and cultivate, and clods more readily, but the farmers consider it a stronger soil.

Cecil sandy clay loam, coarse phase.—The coarse phase of the Cecil sandy clay loam occurs only in Greene County. The soil consists of a shallow covering of very coarse sand to very coarse sandy loam, underlain at 2 to 4 inches by a red, stiff, brittle clay, which contains an appreciable quantity of fine gravel and coarse sand. Included with this soil are many small spots of the Cecil very coarse sandy loam and Cecil clay loam.

The coarse phase of the Cecil sandy clay loam owes its origin to the weathering of a very coarse grained porphyritic granite, to the removal of some of the finer material through erosion, leaving coarser material, or to the washing away of coarse surface material so as to leave the subsoil close to the surface. Because of its rolling to hilly topography the type, when cultivated, is easily eroded. Drainage is well established.

The largest areas of the coarse phase are mapped in the southern extremity of Greene County, just east of Richland Creek. Smaller areas also occur in this section along Kimbro and Shoulderbone Creeks. Another area lies northeast of Greensboro along Richland Creek at its junction with Rush Creek.

Only a small percentage of the area of this phase is cleared and cultivated. The farmed areas are situated on the crests of the narrow ridges; the slopes are so broken and rough that cultivation is im-

possible. The rougher areas are used for pasture. Crops common to the region are grown on this phase, the yields averaging about the same as on the typical soil or somewhat lower.

The following table gives the average results of mechanical analyses of the soil and subsoil of the typical Cecil sandy clay loam:

Mechanical analyses of Cecil sandy clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
256403, 255913½, 256115.	Soil.....	8.2	13.8	7.3	25.5	11.4	17.1	16.6
256404, 255914, 256116.	Subsoil.....	4.3	8.9	3.8	13.8	6.9	19.3	42.9

CECIL CLAY LOAM.

The Cecil clay loam, locally termed "red heavy land," consists of a friable brownish-red to red clay loam to heavy clay loam 6 to 8 inches deep, passing abruptly into a subsoil of stiff, brittle red clay that continues without much change to a depth well below 3 feet. The type is generally free from stony material, except near outcropping quartz veins. Here small areas of stony soil are developed. These areas are indicated on the map by stone symbols.

Some important variations occur in this type. Chief among these are areas of darker soil and subsoil, which represent a gradation toward soils of the Davidson series, and a number of areas closely resembling the Davidson clay loam were mapped as the Cecil because they were underlain by light-colored feldspathic rocks. In a few areas the upper layer contains more or less sand, the material resembling the Cecil sandy clay loam. Small areas of Cecil clay, having only an inch or two of clay loam on the surface, are also included with the type. These are usually found on knolls or slopes where erosion has removed the surface material.

The Cecil clay loam is derived chiefly from light-colored feldspathic rocks, but there is some admixture of material from basic rock which is reflected in the heavy texture and red color. This basic material may come from intrusions of diorite and hornblende schist or from an injection gneiss, which itself is a mixture of feldspathic and basic rock material. Some of the type appears to be derived through erosion, the lighter material having been carried away.

This type is mapped in all the counties covered by this survey, but is not as extensive as the sandy loam and sandy clay loam of the series.

Oconee County.—The type occurs in scattered areas throughout Oconee County, chiefly along the Apalachee River. It occupies the

steeper slopes, either at the heads of streams or the lower parts of hills found elsewhere along the streams. It is derived in part through the weathering of rocks similar to those giving rise to the Cecil sandy loam and in part from fine-grained platy schist carrying a large proportion of basic minerals. It may also be derived from injection gneiss and in part through erosion of the surface material.

More than half of the type in this county is cleared and farmed.

Morgan County.—The largest areas of Cecil clay loam in Morgan County lie in the southwestern section of the county, in a belt extending in a northeast-southwest direction from Shoal Creek in the vicinity of Durden Bridge to Hard Labor Creek midway between Madison and Rutledge. These areas seem to follow a formation consisting in part of injection gneiss. Other areas are mapped in all parts of the county. Most of those in the southeastern part are from mixed light-colored and dark-colored rocks.

The type in this county has a rolling topography and good drainage. A few areas are sharply rolling and deeply dissected by short drainage ways. About 75 per cent of the area is cleared and cultivated.

Greene County.—The Cecil clay loam is of small extent in Greene County, occurring in scattered areas chiefly in the western part, with a few larger areas in the southern part along Richland Creek. The type appears to be derived from a mixed rock formation, or is formed in places through the erosion of the lighter surficial material. It occupies knolls and slopes.

Putnam County.—The Cecil clay loam occurring in Putnam County so closely resembles the Davidson clay loam that in a number of places it was difficult to determine in which series the areas should be classed. Nearly all the type is derived from an admixture of dark-colored and light-colored rocks.

The type is mapped in all sections of the county. A number of important areas occur in the northwestern part between Indian Creek and Little River, and in the southwestern part along the Stanfordville road between Little River and Murder Creek. Another area of importance is found southeast of Meda. The topography of the type in Putnam County is decidedly rolling to hilly.

Nearly all the Cecil clay loam is cleared. Originally it supported a heavy growth of hickory and oak, with some pine, but this was removed in the early days of settlement; the present forest growth consists almost wholly of second-growth shortleaf pine. The type is considered a strong and productive soil, and a number of excellent farms are situated on it in Oconee and Morgan Counties. The general farm crops—cotton, corn, oats, and hay—are produced. Cotton

averages from one-third to one-half bale per acre, the extreme range being from one-fourth bale to more than one bale per acre. Corn yields from 8 to 40 bushels per acre, the average being 10 to 15 bushels. The average yield of oats is about 12 bushels, although on well-prepared land the yield may reach 35 bushels per acre. Cowpea hay yields from one-half ton to 1 ton or more per acre.

Land of the Cecil clay loam sells for $20 to $125 an acre, the average price being about $50 an acre.

Owing to the heavy character of this type, heavy plows and work stock are necessary in order to prepare the land properly. Its texture and structure also require that the land be worked within a narrow range of moisture content, as when it is dry it is hard to plow, and when wet plowing impairs the physical condition. Although this type is naturally retentive of moisture, crops are said to suffer severely in times of drought. This is generally the result of shallow plowing, which does not allow the soil to absorb the rainfall, but turns it into run-off. Deeper plowing, with subsoiling and the incorporation of organic matter, will materially increase the drought resistance of the type.

DURHAM VERY COARSE SANDY LOAM.

The surface soil of the Durham very coarse sandy loam consists of 7 or 8 inches of very light gray to yellowish-gray very coarse sand to loamy very coarse sand. In untilled areas the immediate surface is glistening white. Fine gravel, which composes about 15 per cent of the soil material, characteristically concentrates on the surface after the land has been undisturbed for some time. The upper subsoil, a pale-yellow loamy very coarse sand, gradually becomes heavier, until at 20 to 24 inches it passes into a bright-yellow sandy clay, containing a relatively large quantity of fine gravel and coarse sand. In the lower depths mottlings of yellow and gray may occur. Small spots of coarse sandy loam are included with this type, the difference in texture being slight.

The Durham very coarse sandy loam occurs in a number of small scattered areas in the southeastern part of Greene County, the largest area being at Siloam. Although there are no outcrops of coarse-grained porphyritic granite in this type, the areas mapped lie in the region which is known to be underlain by this rock.

The type has a smooth to gently undulating topography and occupies lower and smoother areas than the associated Appling soils. Many of the areas lie around the heads of streams, and the light-colored subsoil has no doubt developed through leaching. Drainage is generally good.

All the type is cleared and in cultivation. It is farmed in conjunction with the Appling very coarse sandy loam. Crop yields are about the same as on the latter type, in some instances a little lower.

The land is held at about the same price as the Appling very coarse sandy loam.

The areas of this type, although small, are well suited to the production of bright-leaf tobacco.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Durham very coarse sandy loam:

Mechanical analyses of Durham very coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
255917	Soil	15.7	27.9	10.2	20.9	8.2	13.4	3.7
255918	Subsoil	10.3	20.5	7.6	18.2	8.3	17.1	17.6

DURHAM SANDY LOAM.

The surface soil of the Durham sandy loam consists of 7 or 8 inches of a very light gray loamy sand. The soil becomes yellowish gray in the lower part and passes into a subsoil of light-yellow, friable loamy sand which gradually becomes heavier, changing first into a yellow sandy loam and, at depths of 12 to 24 inches, into a bright-yellow, friable sandy clay, which continues to a depth of 3 feet or more. In some places at a depth of about 32 inches slight mottlings of gray appear, and in some places the lower part of the profile shows streaks of red. In the largest area mapped the subsoil in places lies at considerable depth below the surface and is overlain by a loose yellow sand.

This type, like the closely associated Appling sandy loam, is derived from granitic gneiss. The light color of the subsoil is probably the result of leaching, as the areas usually occur in low, flat areas around the heads of streams.

The Durham sandy loam is of small extent, being found only in Greene County, where it is mapped in several areas in the eastern part, the largest lying about 2 miles east of White Plains. Smaller areas are situated north of this point and in the vicinity of Andrews School. The surface of the type is gently undulating, with sufficient relief to afford good drainage.

The Durham sandy loam is not an important type on account of its small extent. Nearly all of it is cleared of its native growth of shortleaf pine and hardwoods. It is cultivated to a small extent, but most of the land is used for pasture. The yields of crops are slightly lower than on the associated Appling sandy loam type. The average price of land of this type is about $40 an acre.

The soil is well suited for special crops, such as bright-leaf tobacco, watermelons, and truck crops.

APPLING VERY COARSE SANDY LOAM.

The Appling very coarse sandy loam, to an average depth of 7 or 8 inches, is a very coarse sand, containing enough fine material to result in a slightly loamy texture. The color is a light gray to yellowish gray, between the light and glaring color of the associated Durham type and the brownish shades of the Cecil very coarse sandy loam. The extremely coarse material, which represents approximately 40 per cent of the soil mass, consists of particles about three-fourths the size of a grain of corn. The subsoil in the upper part is a yellow very coarse sandy loam, but becomes heavier with depth and at an average depth of 15 to 18 inches is a heavy mottled yellow and red, friable sandy clay, containing considerable fine gravel and coarse sand. In places the lower subsoil is reddish yellow or salmon and shows no mottling. The mixture of fine gravel, coarse sand, and clay in the lower subsoil gives it a very hard and compact structure, which is intensified in the substratum. Small areas of the Cecil and Durham very coarse sandy loams, too small to map separately, are included with the type. Areas which closely resemble the Cecil are found on small rises or knolls, and others resembling the Durham occur in low, flat or depressed situations.

The Appling very coarse sandy loam is derived through the weathering of a very coarse grained porphyritic granite, which extends in a broad area through Greene County, with outliers in the southeastern part of Putnam County. Outcrops of this rock in the form of bowlders, with an average mass of 1,200 to 1,800 cubic feet, are a common feature of the type. Most of these outcrops are shown on the map by rock-outcrop symbols. Areas with considerable quartz, fragmental on the surface, are indicated on the soil map by stone symbols.

This type occurs in a large area in the southeastern part of Greene County and to a limited extent in the southeastern part of Putnam County.

Greene County.—In Greene County the Appling very coarse sandy loam is typically developed in an area about 4 miles wide, beginning just south of the Georgia Railroad, midway between Greensboro and Union Point, and extending southward nearly to the Hancock County line in the vicinity of White Plains. A large area, detached from the main development, lies just east of Greensboro.

The type in Greene County, as a whole, has a smooth, undulating to gently rolling topography, characterized by many rounded knolls. It occurs on smooth divides and long gentle slopes extending to the streams, and only a few local areas are sharply rolling. There is sufficient relief to give complete run-off. A few fields are terraced to prevent erosion.

Practically 85 per cent of the type in Greene County is cleared and farmed.

Putnam County.—The Appling very coarse sandy loam is of small extent in Putnam County, being mapped in only one area, situated about 2 miles south of Rockville. The material is not quite as coarse as in the areas in Greene County. A few small spots of Cecil soils are included. The type occupies a rolling ridge and has good drainage. Approximately 75 per cent of the land is cultivated.

All the staple crops of the region, chiefly cotton, corn, oats, and hay, are grown. Cotton yields average one-fourth bale per acre, but on land which has been improved by rotating crops and growing legumes, a yield of 1 bale per acre is not unusual. Corn yields from 5 to 15 bushels, oats 10 to 20 bushels, and cowpea hay from one-half to over 1 ton per acre. Sorghum grown on this type produces a fine, light-colored sirup of good flavor. The best crops on this type of soil are obtained in dry seasons or in seasons of moderate rainfall; in wet seasons the crops are injured by drowning. Although the soil, owing to its open texture, can be plowed early in the season, crops must be planted later than on the red lands to avoid loss of seed from excessive moisture, which sometimes makes replanting necessary. Ridge cultivation is practiced to aid the soil in drying out. These peculiarities of the type are due to the open, loose soil, which readily absorbs the precipitation, and to the compact lower subsoil and substratum, which prevent the downward percolation of the water and cause saturation of the soil.

The selling price of land of this type is $30 to $80 an acre, depending upon the location and improvements.

The Appling very coarse sandy loam is a type which deteriorates rapidly under poor management, but is readily built up and made productive where properly handled. There is ordinarily a deficiency of organic matter in this type. Besides the crops grown, the type is well suited to the production of truck crops and bright-leaf tobacco.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Appling very coarse sandy loam:

Mechanical analyses of Appling very coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
255921	Soil	17.3	20.9	7.5	21.0	11.8	16.4	5.0
255922	Subsoil	9.2	10.0	3.5	10.4	6.0	26.2	34.9

APPLING SANDY LOAM.

The surface soil of the Appling sandy loam, consisting of a layer 7 or 8 inches thick, is composed of an upper layer of light-gray to very light brownish gray sand to loamy sand and lower layer of yellowish-gray material having a similar range in texture. The upper subsoil is a friable, yellow loamy sand. This becomes a sandy loam with increase in depth and passes at an average depth of 18 to 20 inches into a friable sandy clay having a yellow basic color streaked or mottled with red. This material continues to 36 inches or more, the mottlings becoming yellow, red, and gray in the lower part. In some places the subsoil is reddish yellow or salmon colored streaked with yellow. The lower subsoil usually is dense and compact and passes into a very hard and compact substratum. In other places the basic color of the subsoil is as red as in the Cecil series, but mottlings of yellow are always present. The type is intermediate between the Cecil and Durham sandy loam types and includes variations showing the characteristics of each. Typical areas of these soils are included on account of their small size. Other variations occur but are of little importance. In small spots the soil shows some of the characteristics of the Wilkes sandy loam, and in others the material is very light colored, owing to severe leaching.

Stones from quartz veins occur in some places, giving rise to areas of the Appling stony sandy loam. These areas are designated on the map by stone symbols. Except for these, the type is generally free from stony material.

The Appling sandy loam is derived chiefly through the weathering of light-colored or feldspathic rocks similar to those which give rise to the Cecil sandy loam. All the areas lying around the heads of streams and occurring on the lower slopes along stream courses are due to leaching of the subsoil, which produces the light mottled coloration.

This type has a wide distribution. It is found in all four counties covered by this survey. Most of the areas are small.

Oconee County.—The Appling sandy loam is developed in all parts of Oconee County, chiefly in small areas around the heads of streams, although small areas also occur on the crests of ridges. There are included several small areas in which the material below the almost white surface is a gray or bluish-gray sandy clay. All the areas in this county are cleared and farmed or in pasture.

Morgan County.—Areas of this type occur in all parts of Morgan County. They are, for the most part, small and generally occur along stream courses. Some of the larger areas lie near Bostwick and Fair Play. They occupy long, smooth slopes extending down to the depressions occupied by the heads of streams, and contain spots of

the Durham sandy loam. Near Rutledge and along Rice Creek and Rawlings Branch the type also includes some spots of Durham soils. In the southern part of the county, just southwest of Godfrey, the topography is rough and broken and the type closely resembles the Wilkes sandy loam and there are a few spots of true Wilkes sandy loam that have been mapped with the Appling sandy loam. About 60 per cent of the type in this county is cleared and farmed or in pasture.

Greene County.—In Greene County the most extensive development of this type is found in the southeastern corner, between a point about 2 miles southwest of White Plains and the South Fork of the Ogeechee River. Another area lies along the Taliaferro County line, about a mile north of this stream. The other areas in the county are smaller and scattered. They occur principally along stream courses and around the heads of streams. From 85 to 90 per cent of the type in this county is cleared and farmed. A forest growth occurs along the stream courses. It consists of second-growth shortleaf pine.

Putnam County.—Areas of the Appling sandy loam are mapped in all parts of Putnam County, one of the largest being in the northeastern part, northeast of Jefferson Church. This area has a rolling topography and contains spots of Cecil sandy loam and Wilkes sandy loam. In an area about 2 miles northeast of Eatonton a deep variation occurs, in which the lower subsoil of mottled sandy clay lies 30 inches or more below the surface. In an area about a mile west of Eatonton the soil is mixed with Wilkes and Cecil material, but is predominantly Appling sandy loam, and is therefore mapped with this type. About 60 per cent of the type is cleared, but not all of it is under cultivation.

The Appling sandy loam, in all the counties except Putnam, has a smooth, undulating to gently rolling topography and good surface drainage. In Putnam County the topography is more rolling and in some places rough to broken.

On extensive areas of this type the agriculture is not so highly developed as on the Cecil and Davidson types, but on the smaller areas conditions are about the same as on the adjoining types. The type is used for general farming and for pasture. Cotton, the most important crop, yields from one-fifth to three-fourths bale per acre, averaging about one-fourth bale. Corn yields 5 to 20 bushels per acre, with an average of about 9 bushels. The average yield for oats is about 12 bushels. Cowpea hay yields one-fourth to three-fourths ton per acre.

The price of land of this type ranges from $30 to $100 an acre, well-developed areas in Oconee County bringing the higher price.

The Appling sandy loam is one of the lightest soils used for general farming. It is also well suited for special crops, such as market-garden crops and bright-leaf tobacco. Sorghum grown on this land produces a light-colored and fine-flavored sirup. The greatest need of this type is organic matter. This can be supplied by turning under green crops, especially legumes like crimson clover or cowpeas.

APPLING FINE SANDY LOAM.

The surface soil of the Appling fine sandy loam is 7 or 8 inches deep. In the upper part it is a light-gray to brownish-gray loose, mellow, fine sand to loamy fine sand and in the lower part it has the same range in texture but a yellowish-gray color. The subsoil is in the upper part a pale-yellow loamy fine sand. The material becomes heavier with depth, and passing through a yellow, friable, mellow, heavy fine sandy loam grades into a bright-yellow, friable sandy clay. Ordinarily this layer at an average depth of 18 to 20 inches is mottled with yellow, gray, and red. A substratum of mottled yellow and red sandy clay occurs at 36 to 38 inches. The type includes small spots of the Cecil and the Durham fine sandy loams, the latter inclusion occurring around the heads of draws and in the flatter places along the streams.

The Appling fine sandy loam has a comparatively small extent, and is developed only in Putnam County. Several areas are mapped in the region of fine-textured soils in the eastern part of the county between Concord Church and Mount Zion School.

The topography of these areas is rolling to very rolling, and in places the surface is badly dissected by stream courses and gullies. The topography insures good surface drainage.

The Appling fine sandy loam is derived, through weathering, from fine-grained rocks, chiefly gneiss.

About 30 per cent of the area is cleared and under cultivation. The present forest consists of second-growth shortleaf pine, with some oaks and hickory. The usual crops are grown, with prevailingly low yields. Cotton returns from one-fifth to one-half bale per acre, averaging about one-fourth bale. Ordinarily corn yields range from 5 to 8 bushels, and the yield of oats from 10 to 25 bushels, with an average of about 12 bushels per acre. The average price of this land is about $30 an acre.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Appling fine sandy loam:

Mechanical analyses of Appling fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
256207	Soil	0.6	3.5	6.0	55.3	17.0	12.9	4.5
256208	Subsoil	1.0	3.0	5.0	47.5	13.9	18.1	11.3
256209	Lower subsoil.	.4	2.4	4.3	40.3	13.8	15.9	22.5

MADISON GRAVELLY SANDY LOAM.

The surface soil of the Madison gravelly sandy loam consists of a light-brown to brown friable sandy loam 7 to 10 inches deep. The subsoil consists of several inches of a reddish-brown heavy sandy clay underlain by a heavy, somewhat friable clay, which continues to a depth of 3 feet, although the parent rock is occasionally encountered within the 3-foot section. The surface soil carries a large quantity of small, angular fragments of the parent rock, and much similar material is present in the subsoil. There is a considerable amount of finely divided mica in both soil and subsoil, the materials forming the type being derived through the weathering of a quartz-mica schist.

The Madison gravelly sandy loam is mapped in the eastern part of Oconee County. The largest areas are situated near Ebenezer Church, Johnson Church, and Astondale School.

The Madison gravelly sandy loam has a gently rolling to rolling topography and is well drained. It occurs on higher elevations than the surrounding types of the Cecil series.

All the type is cleared and is used for general farming. The yields are about the same as on the closely associated gravelly sandy clay loam of the series. Land of the Madison gravelly sandy loam type is held at $75 to $100 an acre.

MADISON GRAVELLY SANDY CLAY LOAM.

The typical surface soil of the Madison gravelly sandy clay loam consists of 2 or 3 inches of a light brownish red sandy loam, underlain by a brownish-red friable clay loam, which extends to a depth of 8 to 10 inches. In the subsoil there is an upper stratum, varying in thickness from 2 to 12 inches, of brownish-red friable clay, which grades into a lower stratum of heavy, brittle, more or less friable red clay. There is a noticeable quantity of small mica flakes, particularly in the subsoil. The type includes spots of clay loam and sandy loam too small to map. The gravel consists of small weathered fragments of the parent rock, which has a dull-reddish or brownish color. This gravel makes the soil and subsoil looser and more open than the Cecil

soils. The derivation is the same as in case of the type last described. In most areas the parent rock is reached within the 3-foot soil profile.

The Madison gravelly sandy clay loam is developed only in Oconee County. The chief areas are located in the eastern part of the county, in the vicinities of Thomas Store, Johnson Church, and Ebenezer Church.

The topography is gently rolling to rolling. The areas are generally higher than the areas of surrounding soils and in many places occupy distinct knolls. This difference in elevation is due to variation in the resistance of the underlying rock to weathering. The type has good drainage, the relief giving free run-off, and the gravel aiding in the subdrainage. Terracing is required to prevent erosion.

Practically all the type is cleared and farmed. All the crops common to the region are produced with rather good success. Cotton, the chief crop, averages about one-half bale per acre, and corn about 18 bushels. Oats and wheat yield better than on some of the Cecil types. Ordinarily the former yields 18 to 20 bushels per acre, but considerably higher yields are obtained under good management. Wheat yields 12 to 15 bushels and cowpea hay three-fourths to 1 ton per acre.

Agricultural conditions are very good on this type, and there are a number of exceptionally well-established farms upon it. The selling price of land of this type ranges from $75 to $100 an acre.

IREDELL LOAM.

The surface soil of the Iredell loam is a dark grayish brown to dark-brown, mellow, friable loam with a depth of about 6 to 10 inches. The subsoil is a plastic, waxy, sticky clay. In places the subsoil passes into the decomposed parent rock within 3 feet of the surface. The color of the subsoil is a yellowish brown of an olive tone, and is greener in the lower than in the upper part. The color results from the combination of mottlings of yellow, gray, and brown and minute particles of greenish material. In places reddish mottlings also occur, and here the type grades toward the soils of the Mecklenburg series. In a few localities, generally in spots outside of the larger areas of the type, the surface soil is either a fine sandy loam or a sandy loam, but such areas are too small to map separately. Small areas of the Mecklenburg loam are included.

As a whole the type is free of stony material, but in some places there are a few fragments of quartz scattered over the surface. These commonly have a pinkish tint instead of the milk-white color characterizing the fragments in other types. There is also a scattering of angular fragments of the parent rock in a few spots. Black to brownish-black accretions, about three-eighths inch in diameter, are also present and in some places are abundant.

The Iredell loam is derived, through weathering, from dark-colored basic rocks, chiefly diorite or diabase and to less extent fine-grained hornblende schist. Exposures of these rocks are common. This type is mapped only in Greene and Putnam Counties.

Greene County—The largest development of the Iredell loam in Greene County is in the northeastern part, where it is found in several areas of moderate size. The largest lies along the Taliaferro County line, between the North and South Forks of Little River. The other areas lie near Randolph Church, Crossroads School, and Union Point. A number of small, scattered areas occur in other parts of the county, but these are of local importance only.

Putnam County.—In Putnam County the type is typically developed in the glades section, in an irregular area beginning near Presley Mill and extending in a northeast direction for a distance of about 3 miles. This area has a typical low-lying position. Small areas of the Mecklenburg loam are included. A second area of importance is situated about one-half mile northeast of Rudden. The soil here is typical, although the area occupies a long, gentle slope instead of a low, flat position. Another area is found along Cold Branch about a mile west of Free Gift Church. Here the subsoil is considerably deeper than usual, and many diorite fragments are found on the surface. In a small area south of Mount Calvary Church the material grades toward the Wilkes sandy loam. Small spots of local importance are found scattered over the entire county, chiefly around the heads of streams and along stream courses.

The Iredell loam typically has a flat to gently undulating surface lying considerably lower than the surrounding country. The drainage is only fair, and the run-off from some of the more level areas is so slow that artificial drainage is necessary. The type is considered cold, and can be worked only within a narrow range of moisture conditions.

The value of the Iredell loam has been recognized within the last decade. About 75 per cent of the type has been cleared of the native forest growth, which consisted chiefly of oaks and hickory with some shortleaf pine. About 60 per cent is under cultivation, the rest being used for pasture. Native grasses, consisting of broom sedge, crowfoot grass, and lespedeza, also Johnson grass, afford good pasturage. Cotton, when planted on new land, yields about 1 bale per acre for four or five years, after which the yield drops to one-fourth to one-third bale. Corn, the chief crop, yields about 20 bushels per acre, although 65 bushels is sometimes obtained in favorable seasons. Oats yield from 20 to 45 bushels per acre, with an average of about 25 bushels. About 200 pounds per acre of low-grade fertilizer is used with cotton on some fields of this type. Few farmers, however, use fertilizers, on account of the distance to shipping points. Cotton

rusts after several years of planting, but kainit seems to correct the conditions causing this disease. Crimson clover has been used successfully on this type in Wilkes County in building up the type. White clover and red clover grow along roadsides and in some pastures. At the present time (1919) most of the type is farmed by tenants.

Land values on this type range from $15 to $75 an acre, depending upon the improvements and location.

MECKLENBURG FINE SANDY LOAM.

The surface soil of the Mecklenburg fine sandy loam is a brown to dark brownish gray, friable, mellow fine sandy loam, ranging close to a loam in some places. The upper part of the subsoil, beginning at 7 or 8 inches, has a brownish-red to dull reddish brown color, which, upon close examination, shows the coloration to be due to minute mottlings of brown, yellowish brown, yellow, and red. At 12 to 20 inches the reddish brown gives way to a yellowish brown with a greenish or olive tinge. The subsoil material is a plastic, sticky, waxy clay throughout its depth. Except in a few spots where quartz fragments occur, the type is free of stony material.

Besides the typical development there are a few isolated areas in which the soil is a heavy sandy loam and a few others in which it grades toward the Davidson clay loam.

The Mecklenburg fine sandy loam is mapped in Greene County, the chief areas of the typically developed material lying in the northeastern corner along the North and South Forks of Little River, especially in the vicinity of Daniels Springs. Several areas occur east of Union Point and others are mapped in the western part of the county. In a large area southwest of Antioch Church the type resembles the Davidson clay loam, except that the subsoil is much heavier and somewhat plastic.

This type of soil is derived through the weathering of dark-colored basic rocks, chiefly hornblende schist, gneiss, and diorite, with some diabase and peridotite, and includes material which is intermediate between that giving Davidson and that giving Iredell series. It has not been weathered and oxidized to as great an extent as the Davidson material, but is more completely oxidized than the closely associated Iredell material.

In the northeastern part of Greene County the areas have a smooth, undulating to gently rolling topography, being a gradation from the higher red lands to the lower flatwoods or glades. A few areas occur in the flatwoods, but these lie along the slopes of the streams. In the western part of the county the type has a rolling to sharply rolling topography. In most areas the surface drainage is adequate, but the heavy subsoil retards the internal movement of moisture, so that the surface soil is often wet and soggy.

A large part of the area is cleared and used for farming. The original timber, which consisted chiefly of oaks and hickory, has been removed, and the present forest is almost wholly second-growth shortleaf pine. Most of the type is in cultivation—cotton, corn, oats, and hay being the main crops. Cotton, as well as the other crops, gives the best yield in dry seasons or seasons of moderate rainfall. On new land cotton averages nearly 1 bale per acre, but after several years the yield is reduced to one-third bale. Cotton also rusts after the land is planted to that crop for several years. Most of the type is planted to corn, which yields as high as 60 to 65 bushels per acre on well-tilled land, though the average yield is about 20 bushels. Oats yield 20 to 25 bushels per acre. The common grasses of the region grow luxuriantly and produce good pasture and yields of hay. Fertilizers, when used, are of a low grade. They are applied at the rate of 200 pounds per acre. Kainit is a favorite fertilizer, being selected for its effect in checking the cotton rust. Land values on this type range from $25 to $75 an acre.

On account of the heavy nature of this soil it must be plowed and cultivated under a narrow range of moisture conditions. Ridge cultivation is practiced to improve the drainage.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Mecklenburg fine sandy loam:

Mechanical analyses of Mecklenburg fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
255909	Soil	1.4	5.1	4.7	33.8	31.8	15.9	7.1
255910	Subsoil	.4	3.3	2.5	13.4	10.6	16.2	53.5
255911	Lower subsoil.	.7	3.6	2.7	15.8	15.6	24.2	37.2

MECKLENBURG LOAM.

The surface soil of the Mecklenburg loam is a dark-brown or grayish-brown, friable, mellow loam with a depth of 5 to 7 inches. The subsoil consists of a heavy, sticky, plastic, waxy clay. In the upper part of the subsoil the color is reddish brown to dull yellowish brown, the general effect being due to minute mottlings of red, yellow, gray, and some green. Below a depth of 16 to 18 inches the reddish color gives way to a yellowish brown with an olive tinge. The distinguishing difference between the Iredell loam and Mecklenburg loam is the browner color of the soil and more reddish color of the subsoil of the Mecklenburg. This type is intermediate between the Iredell and Davidson soils and includes small areas of soils of

each of these series. In places a few fragments of quartz or of the parent rock are scattered over the surface, but not in sufficient quantity to form a stony type.

The Mecklenburg loam is derived through the weathering of dark-colored basic rocks, principally a hard diorite, or gabbro-diorite. Differences in the degree of weathering of the soil material possibly account for the differences in the soils of the Davidson, Mecklenburg, and Iredell soils. The Davidson soils have a rolling topography and are well oxidized, the Iredell is for the most part low and has developed under conditions less favorable for oxidation. The Mecklenburg is decidedly lower than the Davidson and somewhat higher than the closely associated Iredell loam. For the most part it has an undulating topography. The surface drainage is good, but the internal moisture movement is retarded by the heavy subsoil.

The Mecklenburg loam is mapped in Putnam County, the principal areas lying in the northwestern section in what is locally called "the glades," extending from near Presley Mill to Reids Crossroads. A small area also is mapped just south of Willard. Here the soil closely resembles the Davidson clay loam.

The value of this type has only recently been recognized; it formerly was utilized only for pastures. Most of the type is cleared and either cultivated or used for grazing cattle and hogs. The yields of crops, the uses of the soil, and the price of land are about the same as for the Iredell loam.

DAVIDSON CLAY LOAM.

The Davidson clay loam as mapped in the present survey has two distinct variations, in addition to which there are gradations between the two and between the Davidson and small included areas of the other types. The greater part of the type consists of a dark-red, heavy, friable clay loam surface soil, with an average depth of 6 inches, resting upon a deep-red or maroon heavy clay subsoil, compact and smooth and very sticky and plastic when wet. The subsoil material often extends well below the 3-foot profile, in some cases to depths of 30 to 40 feet, but it is more commonly underlain by a heavy, compact layer of unweathered, mottled red and yellow clay. This mottling is generally believed to be due to the unequal weathering of the minerals in the contributing rocks.

The other variation consists of large areas in which the soil is a dark chocolate brown, friable, mellow, heavy loam to clay loam, which extends to 7 to 12 inches without much change. The subsoil begins as a dark chocolate colored silty clay, very friable and mellow, which becomes heavier in texture and lighter red in color with increasing depth, and at an average depth of about 24 inches grades into the typical heavy, dark-red clay reaching well below 36 inches.

In a few small areas the characteristic dark chocolate colored clay loam extends from the surface down to 30 inches without appreciable change. Small areas of this description are distributed over the region where the Davidson clay loam occurs. The type is locally called "push land," as the soil does not turn readily or scour the plow. From its dark color it also is known as "black land."

This soil closely resembles the Davidson clay, as mapped in Jasper County, Ga., and small areas of the true clay type are included. In these areas the heavy clay is found immediately upon the surface, occurring chiefly as eroded knolls and slopes, or in positions where erosion is most active. In other areas there is a shallow layer of clay loam over the clay, and in some places untilled areas have a very thin covering of sand or fine sand, derived from outcropping veins of quartz or from the injection gneiss, which carries considerable quartz. The type as mapped also includes small bodies of Mecklenburg loam and Cecil clay loam.

The Davidson clay loam is usually free from stony material, but local areas contain some large quartz fragments. Such areas are indicated on the map by stone symbols.

This type is derived from dark-colored basic rocks, chiefly hornblende schist, gneiss, and diorite. Usually the darker colored variation is derived from massive, hard diorite or gabbro-diorite.

The type has a wide distribution in Morgan, Greene, and Putnam Counties; only one area was found in Oconee County, and that was too small to show on a map of the scale used.

The Davidson clay loam is developed under all topographic positions, varying from undulating or gently rolling to steep and hilly. Drainage is well established.

Morgan County.—The greater part of this type in Morgan County is found in the southeastern part, near the Putnam County line, from near Big Indian Creek to Sugar Creek. It occurs in an irregular area about 3 miles wide. The greater part of this area shows the typical dark-red soil, although there are many large and small areas of the dark chocolate colored variation. The smaller of the dark-colored areas are generally intricately associated with the typical soil. The darker areas are found in the more level, smooth, or depressed situations. A number of small stony areas are scattered throughout the type.

The topography generally is rolling. The crests of the ridges are usually smooth, undulating, or very gently rolling, and along the stream courses the topography becomes more broken and steep.

The type here is derived from hornblende schist and diorite, the rock being exposed in a number of places, especially in the road cuts.

Typical areas are also found in the southwestern part of the county, along Little River, from Durden Bridge to Pennington.

Here the soil appears to be derived from the more basic injection gneiss which is found in this vicinity. Smaller areas derived from inclusions of hornblende schist are scattered throughout the county.

Greene County.—One of the largest areas of the Davidson clay loam in Greene County extends from Carey, on the Oconee River, northeastward to Richland Creek, there narrowing to a strip about a mile wide and extending to Shiloh Church. In this area the soil, which is typically developed, is derived from hornblende schist. As Oconee River is approached the topography becomes more broken and irregular, the ridges narrower, and the slopes steeper.

Another area of importance is found in the southwestern part of the county, between the Oconee River and Richland Creek and Ridge Grove School and Pine Grove Church. In this area the type is found on narrow-crested ridges and steep slopes and the topography is sharply rolling to almost hilly.

Along most of the drainage courses in this section there are slopes that generally are too steep for cultivation with improved implements, and the surface is covered with sand derived from quartz veins and stringers cutting the basic rock formations. Quartzite is also found on the surface, giving rise to some stony areas.

Other scattered areas of importance are found throughout the northwestern section of Greene County, notably in the vicinities of Antioch Church, Oakland School, and Mount Zion Church. These areas have a rolling topography and are derived chiefly from dark-colored schist and gneiss.

In the northeastern part of the county, beginning at Union Point and extending to the county line, there are found scattered areas that represent outliers of an important area of the heavier variation of the type in Oglethorpe County.

Putnam County.—A large development of the Davidson clay loam occurs in the northwestern part of Putnam County, in a belt extending from the Jasper County line northeast to the vicinity of Rudden. In this area the soil is a heavy variation closely resembling the clay type. Here the surface material consists of a heavy clay loam that at a depth of 4 or 5 inches rests upon a heavy clay subsoil.

The latter is frequently exposed in areas subject to erosion. The subsoil in this area, as in most of the type in Putnam County, is very heavy, dense, and compact, much more so than that in the other counties.

Other large areas of importance are found in the southwestern part of the county. At many places in this section quartz veins outcrop and give rise to stony areas indicated on the map by stone symbols. At Howard Branch Church the dark-colored variation of the type is found. Large areas of the type also are mapped in the northeastern part of the county, especially along the Oconee River.

Practically all the type in Putnam County is derived from hornblende schist and hard, massive gabbro-diorite. In local areas light-colored acidic rocks cut into the formation, but not sufficiently to influence the soil. Over a large part of the area the underlying rocks are deeply weathered and only traces of the nearly decomposed rocks are seen in the road cuts.

The Davidson clay loam in this county has a very rolling to broken topography. The crests of the main divides are usually irregular and are dissected by the heads of numerous streams. The slopes along the stream courses are usually so steep that they are allowed to remain in forest, now mainly second growth.

The Davidson clay loam is one of the strongest and most important soils in this survey. About 85 per cent of the type is cleared in Morgan and Greene Counties, and 65 to 70 per cent in Putnam County. The original timber, consisting of hardwoods, such as oaks and hickory, with some pine, has been removed, with the exception of small tracts around homesteads. The present growth consists of second-growth shortleaf and loblolly pine, with a scattering of oaks, hickory, and dogwood. The original timber was of great height, indicating a naturally fertile soil.

Cotton and corn are the chief crops grown on this type; oats, cowpeas, and wheat occupying only a small proportion of the land under cultivation. The average yield of cotton is more than one-half bale per acre, the range being from one-third to 1 bale or more per acre. Corn ordinarily yields 15 to 18 bushels per acre, although as much as 40 to 50 bushels is obtained where efficient methods are used. Wheat returns 12 to 15 bushels per acre, and oats 15 to 18 bushels, although in good seasons and with good management as much as 40 to 50 bushels have been obtained. Cowpeas produce from one-half to 2 tons of hay per acre.

Farmers consider this a desirable soil, as it is inherently strong and when well cared for maintains its productiveness. It produces good crops of cotton and is well adapted to the small grains, which make a good growth of straw and large heads, the latter filling better than on other soils.

The price of this land ranges from $15 to $100 or more per acre, depending upon the location and improvements. The lower priced land is usually poorly located in relation to public roads and generally has a rough and somewhat broken topography.

This type of soil has been found in various parts of the South to be especially adapted for cotton, corn, small grains, grasses, legumes, including alfalfa, and peaches. Many of the best peach orchards of Jones County are located on this type of soil.

Davidson clay loam, hilly phase.—The hilly phase of the Davidson clay loam is mapped in a number of small areas along the Oconee River. It differs from the typical soil only in its hillier topography, which is of a nature that precludes farming. Areas of the phase should be used for pasture or forest lands.

WILKES SANDY LOAM.

The surface soil of the Wilkes sandy loam is for the most part a gray to light-brown loamy sand to light sandy loam, with a depth of 5 to 8 inches. The subsoil is typically developed in two distinct and contrasting layers. The upper is from 12 to 20 inches in thickness and consists of a friable, yellow to reddish-yellow or brownish-yellow, heavy sandy loam, quickly grading into a light sandy clay, in places mottled with yellow, red, and gray. The lower, into which the upper may pass gradually or change abruptly, is a heavy, sticky, plastic clay of a mottled yellow and red color similar to the markings of the lower part of the Appling material. In other places this lower stratum is a heavy, plastic, waxy and sticky clay of a yellowish-brown color, with an olive or greenish tinge, the color resulting from a combination of minute mottlings of yellow, gray, brown, and green. This part of the subsoil is identical with that of the Iredell series. In places a reddish mottling also occurs.

In another variation of this type the material is mixed in a vertical manner instead of horizontally. In these places material similar to the Appling subsoil is found in close association with Iredell material. The streaks of each occur in various widths, but those of the Appling are more numerous. Usually the subsoil passes into the decomposed rock within the 3-foot profile. In eroded areas the surface soil has been removed, leaving the subsoil in irregular columns, supported by the underlying rock.

Included with this type are some small areas which are rather indefinite in character, being composed of a mixture of small patches of several types.

The Wilkes sandy loam is a residual soil derived from the weathering of two widely different classes of rock occurring in close association in the field. The rock most commonly underlying this type is a light-colored granite-gneiss composed principally of feldspar and quartz, with little or no mica, and sometimes termed aplitic granite. In places this rock is found associated with hornblende schist, and in other places it is cut by dikes of diorite or pegmatite. The light, sandy upper part of the type is derived from the light-colored acidic rocks, and the heavy plastic, impervious strata come from the basic rocks of the formation. This type is mapped in large areas in Greene and Putnam Counties.

Greene County.—In Greene County an important area lies along Fishing Creek, several miles northwest of Penfield. Here the lower impervious layer resembles the Iredell subsoil and spots of Iredell loam and sandy loam too small to be shown separately are scattered over the area. The topography of this area is rolling and most of the land is under cultivation.

The second area of importance is found in the southern part of the county, in the vicinity of Riceville and Walkers Churches. The subsoil of this area is a mottled yellow and red plastic clay. In a few places stones, chiefly vein quartz, are present in sufficient quantities to interfere with cultivation. In this region the topography is smooth enough on the crests of ridges for cultivation, but on the slopes it is very broken. A similar area occurs north of Ridge Grove School.

Smaller areas are mapped in the northeastern part of the county, along the North and South Forks of Little River. Another area, occurring at the head of Richland Creek about 2 miles west of Union Point, is badly broken and the rock lies near the surface, the material resembling the mixed Appling and Iredell variation. Most of the areas in this section occur around the heads of streams and include spots of several different types, particularly a white or chalky heavy clay.

Putnam County.—Several large areas of this type lie in Putnam County. One of the most important is situated several miles northwest of Eatonton, extending from the vicinity of Wright School northeastward to within a short distance of Sandhill Church. In this area the lower impervious layer of plastic clay is mottled yellow and red and contains some material which is like that of the Iredell series. The area has a sharply rolling and broken topography. The crests of the ridges are very narrow and the slopes are gullied and eroded.

Another important area is mapped in the southeastern part of the county along Rooty Creek. While in this area the predominant material of the subsoil is like that of the Iredell, there are included areas of mixed Iredell, Appling, and Durham soil which are so intricately associated that they could not be separated. The topography of this region is very rough and broken.

A third important area is situated about 2 miles southwest of Eatonton. This area closely resembles the Appling sandy loam, but includes many spots of Iredell sandy loam. A number of smaller areas are mapped in all parts of the county.

The greater part of this type in Putnam County is derived from an aplitic granite which is cut by basic rocks.

The Wilkes sandy loam, although occupying a considerable area, is not an important agricultural soil, chiefly because of its generally

broken and hilly topography. About 50 per cent of it is cleared, but not more than 25 per cent is under cultivation. The uncleared areas support a forest of second-growth shortleaf pine. The common crops of the region are grown. The yields are prevailingly low. Cotton averages one-fifth to one-fourth bale, while corn averages about 8 bushels and oats about 12 bushels per acre. There is some complaint of cotton rusting and corn frenching on this type. Land of this type is held at low prices.

MOLENA SANDY LOAM.

The surface soil of the Molena sandy loam is a friable, mellow loamy sand to heavy sandy loam. It is somewhat variable in color, being for the most part brownish red, but large areas of very dark brownish red or chocolate-colored material occur, and in smaller areas the soil is sometimes brownish gray. The subsoil consists of a red to dark-red, friable loamy sand, passing at an average depth of 20 to 22 inches into a dark-red, friable sandy clay, which continues to 3 feet or more. In some places the heavy sandy clay is only 12 inches below the surface, while in others it may not appear within the 3-foot profile, such areas being more properly a loamy sand. A heavy clay similar to that of the Cecil or Davidson series is found at the lower depths in places where erosion has been active. Some waterworn quartz gravel is found in places on the surface and through the soil mass.

The Molena sandy loam is mapped in Greene County only, occurring along the Oconee River and to a small extent along the Apalachee River. The largest area is found on the east side of the Oconee River, about 2 miles southwest of Oakland School. Other areas of smaller extent have a scattered distribution. Several, somewhat detached from the general region of occurrence, lie along Town Creek.

The Molena sandy loam is almost identical with the Greenville sandy loam of the Coastal Plain section of Georgia, and is totally unlike the residual soils of the Piedmont region. Its origin has not been definitely ascertained.

This type occupies broad, gently rolling areas, chiefly upon the crests of divides; in some places it is found on long slopes, but usually on the lower slopes it gives way to the heavy residual soils of this region. The material occurs as a blanket of sand and sandy clay over the eroded hills of the region in which it is found. The topography, while gently rolling to rolling, is more rounded and less angular than in the surrounding areas. In some places the topography resembles that of the high river terraces but is more rolling and irregular than typical terrace areas. The surface relief and the texture and structure of the soil material favor good drainage, and

drainage is excessive in the areas of deeper soil material. Here crops are said to suffer acutely from drought in protracted dry seasons.

The greater part of the Molena sandy loam is cleared. The existing forest consists of second-growth shortleaf pine. The type is utilized for the production of the common crops of the region. Cotton is the leading crop. The average yield is about one-third bale per acre, although on some farms yields of 1 bale per acre are obtained in good seasons. Corn yields 15 to 25 bushels per acre, and oats 12 to 15 bushels. The best yields of all the crops are obtained in rather wet seasons. Land of this type sells for $20 to $30 an acre.

This type of soil has a wide range in crop adaptation. It can be used successfully for general farm crops or for special crops, such as watermelons, potatoes, and other truck crops. It is recognized as an early soil. Its light texture is favorable to early plowing and handling under a wide range of moisture conditions. Light equipment can be used effectively.

WICKHAM SANDY LOAM.

The surface soil of the Wickham sandy loam is somewhat variable, ranging from a reddish-brown to dark reddish brown, friable, mellow fine sandy loam to sandy loam. The normal depth is 7 or 8 inches. The subsoil is typically a red to dark-red, friable, heavy sandy clay, which continues to a depth of 36 inches or more. In some places the surface soil is heavier than typical, consisting of a reddish-brown friable clay loam, but these areas are more or less confined to knolls and slopes. In some small included areas the lower subsoil is a heavy clay or silty clay.

The Wickham sandy loam is derived from stream deposits transported from the general region of crystalline rocks. In most places it is fairly well drained, as it lies above the normal overflow level of the streams.

This type is mapped in small areas along the Oconee River in all the counties covered by the present survey except Putnam County.

Oconee County.—The Wickham sandy loam occurs in a few scattered areas in the southeastern part of Oconee County, along the Oconee River. These areas are rather narrow and of no great extent.

Morgan County.—Only two areas of this type are found in Morgan County, the largest occurring about 2 miles southeast of Swords, just south of the point where the Georgia Railroad crosses the Oconee River. Here the soil in places approaches a clay in texture, and the lower subsoil is a friable though stiff clay. Spots of fine sandy loam also occur. A more typical area is mapped farther south along the river, just below Parks Ferry.

Greene County.—The type has its greatest development in Greene County. The largest area is located in the northern part, along the

Oconee River and about 2 miles north of Watson Spring. This area is notable for its high position and favorable topography. It is situated about 75 feet above the river and has a smooth, even surface. Some waterworn gravel occurs in this area. The type is also mapped in well-developed areas northwest of Carey, on the north side of the Madison road along the Apalachee River, and in a big bend of the Oconee River above Long Shoals. In all these areas the type occurs on benches or terraces which lie appreciably higher than the smaller areas of the county.

The Wickham sandy loam in general has a smooth, level topography and occupies comparatively level benches lying between the upland and the stream bottoms subject to overflow. These benches are from 30 to 50 feet above the normal stage of the river, except those in Greene County, which are higher. They have sufficient slope for surface drainage.

This type was originally forested with oaks and hickory and other hardwoods and some shortleaf yellow pine. At present all the type is cleared and under cultivation, as its natural productiveness is recognized. Cotton ordinarily yields one-half to two-thirds bale per acre, and yields of 1 bale per acre are not at all uncommon. Corn yields 20 to 30 bushels per acre and oats 20 to 25 bushels Not much fertilizer is used on this soil.

Land of the Wickham sandy loam ranges in price from $35 to $50 an acre, depending upon the location and improvements.

ALTAVISTA SANDY LOAM.

The surface soil of the Altavista sandy loam consists of 7 or 8 inches of friable sand to loamy sand, yellowish gray to light brownish gray in the upper part, yellower in the lower part. The upper subsoil is a friable light-yellow loamy sand to sandy loam. This gradually becomes heavier with depth and passes at 15 to 18 inches into a bright-yellow friable sandy clay, mottled with yellow, red, and gray below 28 or 30 inches.

The Altavista sandy loam is derived from stream deposits, now lying well above the flood plains. It occurs on the terraces along Oconee River and Richland Creek in Greene County. It is not extensive, being developed in rather small-sized areas.

The type has a level to undulating topography. Drainage is generally fair, although in some areas, as along the margin of the uplands, seepage keeps the land wet most of the time.

About 50 per cent of this type is cultivated. It is planted chiefly to cotton and corn. Yields are generally lower than on the associated Wickham sandy loam.

CONGAREE FINE SANDY LOAM.

The surface soil of the Congaree fine sandy loam varies from a light-gray loamy fine sand to a light-brown mellow and friable fine sandy loam from 7 to 12 inches deep. The subsoil normally is a light-brown mellow, heavy fine sandy loam, underlain by a heavy, friable fine sandy clay, which generally continues to a depth of 36 inches, although in local spots it passes into a brownish-red friable silty clay in the lower part of the 3-foot profile. A number of variations occur in the subsoil. In places it is composed of layers of material of different textures and colors. Along the immediate banks of the streams are narrow areas in which the material consists of a mellow, friable loamy fine sand of light yellowish brown color throughout the soil and subsoil. Such areas are natural levees built up by the rivers. In depressions the material is much heavier, approximately a silty clay loam, and in some areas sand covers the surface.

The Congaree fine sandy loam is derived from material deposited by the stream in times of flood. It occurs in rather narrow strips in the first bottoms of the Apalachee and Oconee Rivers in all four of the counties surveyed, but is not extensively developed in any.

The type has a smooth, level topography, but the surface is sufficiently above the streams to insure good drainage in seasons of normal rainfall. After continued rains it is subject to overflow, and crops on the land at such times are generally ruined. A few wet places occur in the areas, mostly at the foot of the upland slopes, where springs issue.

The Congaree fine sandy loam is a desirable type. About 50 per cent of it is cleared and used for pasture or cultivated. The uncleared areas are covered chiefly by second-growth shortleaf pine and underbrush. The native forest comprised such trees as oaks, hickory, gum, tulip poplar, ash, elm, sycamore, and willow. Most of the merchantable timber has been removed.

Corn and forage crops are raised on this type. The average yield of corn is about 30 bushels per acre. The lowest yields are obtained on the light sandy spots. Sorghum and cowpeas mixed make a heavy, rank growth and yield from 1 to 2 tons of hay per acre. A mixture of broom sedge, Johnson grass, and Bermuda grass is cut for hay. No fertilizers are used on this type.

Land of the Congaree fine sandy loam is usually sold in conjunction with the adjoining upland types. It is usually valued at about $40 to $60 an acre.

This is a valuable soil for forage crops and corn and also for pasture. It can be used to a great advantage in stock farming in conjunction with the upland types.

CONGAREE SILTY CLAY LOAM.

The Congaree silty clay loam has a surface soil consisting of 8 to 12 inches of a heavy, friable, and somewhat mellow silty clay loam to silty clay of dark-brown to dark reddish brown color. The upper subsoil material is prevailingly a heavy silty clay of a dark reddish brown color. Below 18 to 20 inches the subsoil generally contains strata of material of various colors and textures, ranging from sand to heavy clay. In many places the entire subsoil is composed of strata of sand and clay. Included with the type are small areas of sand and others high in silt.

The Congaree silty clay loam is an alluvial soil derived from material transported from areas of crystalline rocks. It is developed in the first bottoms along the various streams of the four counties and is subject to overflow. Along the rivers it occupies depressions or sloughs which hold backwaters, and along the smaller streams it occurs where the drained areas consist of the heavier types of soil.

Oconee County.—In Oconee County this type occurs in small sloughlike areas along the outer margins of the bottom lands of the Oconee River, generally at the foot of the upland slopes. In these areas the silty clay soil commonly extends to a depth of 18 inches before strata of sand and other material are encountered. The type also occurs in large areas along Rose, Wildcat, Greenbrier, and Barber Creeks. In almost all these areas the soil is typical, but in a few places, as at the confluence of small streams, more or less sandy material has been deposited over the surface.

Nearly all the areas along the creeks are cleared, but only a few along the river are cleared and cultivated.

The type is subject to overflow after heavy rainfall. Along Rose Creek and Barber Creek drainage is thoroughly established.

Morgan County.—In Morgan County a few areas of Congaree silty clay loam lie along the Apalachee River, but the more extensive developments occur along Indian, Hard Labor, Sandy, and Sugar Creeks and Little River. On Sugar and Hard Labor Creeks the material is well developed and continues to a depth of 3 feet without much change. About 40 per cent of the type in Morgan County is cleared.

Greene County.—This type is extensively developed in Greene County, along the Oconee River and Richland Creek. It is also found along Fishing Creek and the North and South Forks of Little River.

Along the Oconee River several areas included with the type have a smooth, friable, reddish-brown silt loam surface soil. These areas belong to the Congaree silt loam type, but were included on account of their relatively small area. Along this river, in the northern part

of the county, the subsoil grades into sand or fine sand at depths of 15 to 24 inches. In other places along this stream, especially in some of the low, poorly-drained sloughs, the lower subsoil consists of a heavy, sticky, mottled silty clay.

Most of the type is cleared and farmed. The Richland Creek area is partly in forest.

Putnam County.—In Putnam County the largest developments of the Congaree silty clay loam are found in the northwestern part, along Little River and Indian Creek. The type is for the most part typically developed, but in a large area along Oconee River, north of Reids Ferry, a number of small bodies have a surface covering of fine sand and silt. About 80 per cent of the type mapped along the Oconee River is cleared; along the creeks there is a considerably smaller proportion cleared. Very little of the type is cleared along Little River and Indian Creek.

The Congaree silty clay loam occupies low, flat areas along stream courses and is subject to overflow with comparatively slight rise of the stream level. In many places the water remains on the surface for a considerable length of time, as the run-off is not rapid. By straightening and deepening the stream channels the drainage of this type could be materially improved. Some projects of this kind are now surveyed. The forested areas are covered by a heavy growth of white oak, water oak, chestnut oak, hop hornbeam (commonly called ironwood), haw, hackberry, elm, sycamore, shortleaf pine, hickory, poplar and other less common trees. Much of the cleared area is used for pasture and hay, the native grasses, such as Bermuda, crowfoot, crab, broom sedge, and also Johnson grass, making a rank growth. The chief crops are corn, sorghum, and cowpeas. Corn yields 20 to 40 bushels per acre. A mixture of sorghum and cowpeas makes a rank growth and produces an average of 2 tons of forage per acre. Oats average from 20 to 30 bushels per acre.

This type of soil is one of the strongest of the area for corn and forage crops. If drained, its value even for these crops would be considerably enhanced.

MEADOW (CONGAREE MATERIAL).

Under this classification there are included those areas of first-bottom land in which the soil material is so mixed that no specific type designation could be assigned to it. For the most part the material ranges from loose, recently deposited, light-gray sand to a brownish-gray sandy loam. On the surface the material varies from a silty clay loam to a sand within short distances. In the lower part the material consists of many different strata, varying in color from gray to red and in texture from coarse sand to clay. These strata represent different depositions of material and range in thickness

from a fraction of an inch to as much as 2 or 3 inches. Sand flats are common through all the areas. In Greene County, where the streams pass through the region of very coarse loams, considerable fine gravel and coarse sand is found in this soil.

Meadow (Congaree material) is mapped along a number of streams in all the counties covered by this survey. It does not vary materially from one county to another.

The areas lie in the first bottoms and are subject to overflow. They are low and flat and poorly drained. Comparatively little of the land is cleared and a very small percentage of the cleared area is under cultivation. The forest growth is chiefly alder and willow, with some pine and sycamore. Meadow is used chiefly for pasture and hay crops. Corn, which is occasionally grown, produces 12 to 30 bushels per acre. No fertilizers are used. The best crops are obtained on those areas in which the soil contains considerable clay.

ROCK OUTCROP.

The areas mapped as Rock outcrop consist of areas of rock exposures which support no vegetation, or at most only a few short, stunted trees that spring from crevices in the rocks.

The largest area of Rock outcrop comprises Flat Rock, a well-known topographic feature in Greene County about 3½ miles south of Veazey. Here the rock rises a little above the surrounding country and has a slightly undulating or wavy surface. A smaller area is mapped in the eastern part of Putnam County.

SUMMARY.

The soil survey of Oconee, Morgan, Greene, and Putnam Counties, Ga., covers an area of 1,298 square miles, or 830,720 acres.

The counties are situated in the north-central part of the State, in the Piedmont region.

The topography is rolling to hilly. It is more rolling in the southern part of the area, and in some places, notably Greene and Putnam Counties, it is rough and broken. Glades, or "flatwoods," also occur in these two counties.

The drainage consists of an intricate network of streams. The Oconee, Apalachee, and Little Rivers are the main streams. The eastern part of Greene County is drained by the headwaters of the Ogeechee and Little Rivers.

Oconee County has a population of 11,067, or an average of 64.3 per square mile. Watkinsville is the county seat and chief town.

The population of Morgan County is 20,143, or 51.6 persons per square mile. Madison is the largest town and the county seat, with Rutledge next in importance.

Greene County has a population of 18,972, or 45.6 per square mile. Greensboro is the county seat. Union Point is the town of second importance.

The population of Putnam County is 15,151, or 42 persons per square mile. Eatonton is the county seat and chief town.

Railroad facilities are afforded by the Georgia Railroad and its branches, the Central of Georgia branch lines, and two local lines, the Union Point & White Plains Railroad in Greene County, and the Greene County Railroad in Morgan County.

The climate is characterized by long summers and comparatively short winters. The rainfall averages about 47 inches per year and is well distributed throughout the growing season.

The early agriculture was of a self-sustaining type. Cotton became the chief crop about the time of the Civil War. The agriculture of the present is centered upon cotton production. From 40 to 60 per cent of the improved farm land is planted to cotton. The average yield per acre is one-third bale, except in Oconee County, where it is nearly one-half bale per acre.

Corn is the second crop in importance, but not enough is produced to supply the local demands. The ordinary yields range from 9½ to 12 bushels per acre.

Oats, rye, and wheat are of minor importance in the agriculture of these counties. Cowpeas are an important crop for forage and soil improvement.

Cattle and hogs are not raised in sufficient numbers to supply the local needs for beef and pork. Increased interest is being manifested in the animal industries, especially in the production of hogs and beef cattle.

Mules are the chief work stock. Generally light implements are employed for plowing and cultivation. Improved types of farm implements are becoming popular.

Definite crop rotations are followed on only a few farms. Commercial fertilizers, mostly ready mixed, are depended upon for the production of the cotton crop. Expenditures for fertilizer in 1919 ranged from $283,374 in Putnam County to $632,687 in Morgan County. From 76 to 85 per cent of the farms of the several counties are operated by tenants.

The soils are derived from crystalline rocks of varying composition. Most of the types are upland, but there are a number of old-alluvial or terrace types and first-bottom or recent-alluvial types. The upland soils are divided into broad groups, one including soils derived from light-colored or feldspathic rocks and the other from dark-colored or basic rocks.

The Cecil very coarse sandy loam is an important type in Greene County and forms some small areas in Putnam County. It is dis-

tinguished by the very coarse texture. The material is derived from a coarse-grained porphyritic granite.

The Cecil sandy loam is an important and extensive type, being developed in large areas in all the counties surveyed.

The Cecil fine sandy loam is mapped only in Putnam County. It has a fine to very fine surface soil and is readily distinguished from the other sandy types of this series.

The Cecil sandy clay loam is the most extensive soil in the area. It is mapped in large areas in all the counties. It is esteemed as the most desirable type of the Cecil series, and is suited to all the general crops commonly grown in this region.

The Cecil clay loam is well developed and comprises a part of the red lands of these counties. It is a strong type of soil.

The Durham very coarse sandy loam is of small extent, being found only in scattered areas in Greene County.

The Durham sandy loam is limited in extent and is developed only in Greene County.

The Appling very coarse sandy loam is an important type in Greene County, and there are a few areas of it in Putnam County.

The Appling sandy loam is developed in areas of various size in all parts of the area. A large proportion of it occurs around the heads of streams.

The Appling fine sandy loam has a fair-sized development in Putnam County.

The Wilkes sandy loam is derived from a mixture of rocks, this condition being reflected in the complex character of the subsoil. Most of the type has a broken topography. It occurs in large bodies in Putnam and Greene Counties.

The Iredell loam is a type distinguished by its heavy plastic waxy subsoil, which has a characteristic color—a yellowish brown tinged with olive. It is the prevailing type in the glades, or "flatwoods" section.

The Mecklenburg fine sandy loam occurs in Greene County. The Mecklenburg loam is closely associated with the fine sandy loam in Greene County and also occurs in the glades of Putnam County. These soils are intermediate between the soils of the Davidson and the Iredell series.

The Davidson clay loam occurs in Morgan, Greene, and Putnam Counties. It comprises the dark-red clay lands sometimes referred to locally as black lands. It is derived from dark-colored basic rocks. This type is one of the best general farming soils in the area surveyed.

The Madison gravelly sandy loam and gravelly sandy clay loam types are closely associated. They are mapped only in Oconee County and are of small extent. The soils are derived from a quartz-mica schist.

The Molena sandy loam is of undetermined origin and occurs only in Greene County. The type comprises light sandy soils which are well suited both for general farming and special crops.

The Wickham sandy loam is an alluvial terrace soil lying well above overflow. The soil is brown and the subsoil reddish brown to red. It is a valuable soil for general farming.

The Altavista sandy loam is also a terrace soil, but has a mottled yellow and red instead of uniform red subsoil as in the Wickham sandy loam. It is mapped in a number of small areas in Greene County.

The Congaree soils are first-bottom alluvial types which have a brown soil and a red subsoil and are subject to overflow. The fine sandy loam and silty clay loam types are mapped in all the counties included in this survey.

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U S DEPT. OF AGRICULTURE
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MILTON WHITNEY, CHIEF
CURTIS F MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
GEORGIA
GREENE AND PUTNAM COUNTIES SHEET

GEORGIA STATE COLLEGE OF AGRICULTURE
ANDREW M. SOULE, PRESIDENT
DAVID D. LONG, IN CHARGE SOIL SURVEY

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort.

Secondary roads and Trails

Railroads Steam and Electric

Bridges, Ferry

R.R.crossings, Tunnel

Ford, Dam

School or Church Cemeteries

Mine or Quarry Mine dumps Made land

Bluff, Escarpment, Rock outcrop and Triangulation station

Stony and Gravelly areas

Soil boundaries

Boundary lines

Boundary lines

Boundary lines

U.S.township and section lines

RELIEF
(Printed in brown or black)

Contours Depression contours

Prominent Hills Mountain Peaks

Sand Wash, and Sand dunes

Shore and Low-water line, Sandbar

DRAINAGE
(Printed in blue)

Streams

Lakes, Ponds, Intermittent lakes

Intermittent streams

Springs, Canals and Ditches, Flumes

Swamp Salt marshes

Submerged marsh Tidal flats

The above signs are in current use on the soil survey sheets, but the range is not necessarily more or earlier dates.

LEGEND

Altavista sandy loam — Congaree fine sandy loam

Appling sandy loam — Congaree silty clay loam

Appling fine sandy loam — Davidson clay loam

Appling very coarse sandy loam — Hilly phase

Cecil sandy loam — Durham sandy loam

Cecil fine sandy loam — Durham very coarse sandy loam

Cecil very coarse sandy loam — Iredell loam

Cecil sandy clay loam — Mecklenburg fine sandy loam

Hilly phase — Mecklenburg loam

Coarse phase — Molena sandy loam

Fine-textured phase — Wickham sandy loam

Cecil clay loam — Wilkes sandy loam

Rock outcrop — Meadow *(Congaree material)*

W. Edward Hearn, Inspector Southern Division.
Soils surveyed by David D. Long of the Georgia State College of Agriculture in charge, and E. T. Mason, N. M. Kirk, H. G. Lewis, and H. V. Geib, of the U.S. Department of Agriculture.

Scale 1 inch = 1 mile

1 ½ 0 1 2 3 4 Miles

Field Operations Bureau of Soils 1919.

U. S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
GEORGIA
OCONEE AND MORGAN COUNTIES SHEET

GEORGIA STATE COLLEGE OF AGRICULTURE
ANDREW M. SOULE, PRESIDENT
DAVID D. LONG, IN CHARGE SOIL SURVEY

LEGEND

Appling sandy loam — A	Davidson clay loam — Dc
Cecil sandy loam — Cs	Madison gravelly sandy loam — Mg
Cecil sandy clay loam — Cc	Madison gravelly sandy clay loam — Mc
Cecil clay loam — C	Wickham sandy loam — Ws
Congaree fine sandy loam — Cr	Meadow (*Congaree material*) — M
Congaree silty clay loam — Cg	

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort.
- Secondary roads and Trails
- Railroads, Steam and Electric (DOUBLE TRACK, SINGLE TRACK, IN CONSTRUCTION, IN YARD)
- Bridges, Ferry
- R.R. crossings, Tunnel (R.R. ABOVE, R.R. BELOW)
- Ford, Dam
- School or Church, Cemeteries (CEM)
- Mine or Quarry, Mine dumps, Made land
- Bluff, Escarpment, Rock outcrop and Triangulation station
- Stony and Gravelly areas
- Soil boundaries
- Boundary lines (STATE, COUNTY)
- Boundary lines (LAND GRANT, CITY OR VILLAGE)
- Boundary lines (CIVIL TOWNSHIP, RESERVATION)
- U.S. township and section lines

RELIEF
(Printed in brown or black)

- Contours, Depression contours
- Prominent Hills, Mountain Peaks
- Sand, Wash and Sand dunes
- Shore and Low-water line, Sandbar

DRAINAGE
(Printed in blue)

- Streams
- Lakes, Ponds, Intermittent lakes
- Intermittent streams
- Springs, Canals and Ditches, Flumes
- Swamp, Salt marshes
- Submerged marsh, Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier issues.

W. Edward Hearn, Inspector Southern Division.
Soils surveyed by David D. Long of the Georgia State College of Agriculture, in charge, and F. A. Hayes, E. C. Hall and G. A. Crabb of the U. S. Department of Agriculture.

Scale 1 inch = 1 mile (1 ½ 0 1 2 3 4 Miles)

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Bureau of Soils
1919